

Effect of Polyherbal Liver Stimulant (GenoLiv) on Production Performance, Carcass Characteristics, Serum Biochemistry and Immune Response in Commercial Broiler Chickens

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ABSTRACT

This study was aimed to evaluate the efficacy of the polyherbal formulation "GenoLiv" in commercial broiler chicken for growth and productivity. A trial on the VenCobb 430 Y breed of commercial broilers (n=180) was conducted for 35 days. The broilers were divided into two groups, viz., control (basal diet fed) and treatment (basal diet + GenoLiv @ 0.25 kg/MT feed). The parameters like body weight gain, feed consumption, feed conversion ratio (FCR), European production efficiency factor (EPEF), carcass characteristics, organ weights, hematology, serum biochemistry and hemagglutination inhibition (HI) titers were assessed. The results showed enhanced body weight gain by 9.28% and improved FCR by 6.32% in broilers fed with GenoLiv. The EPEF percentage was enhanced by 19.2% compared to the control depicting the improved overall hepatic performance of the broilers. Reduced fat pad percentage by 11.25% illustrated the increased lipid metabolism. The results showed enhanced immune response and improved livability among the GenoLiv-fed birds.

Key words: Broiler chicken, Carcass characteristics, Hepatostimulant, Polyherbal formulation, Productive performance.

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INTRODUCTION

The health and productivity of poultry largely depend on optimum feed utilization, improved body weight, absence of disease and low mortality (Jogi and Johar, 1997), which are directly related to optimum liver health. The liver is a vital organ actively involved in many metabolic functions and is a frequent target for several diseases and toxicants (Meyer and Kulkarni, 2001). Rapid and maximum growth in a minimum period with efficient feed utilization is paramount for profitable broiler production. The production of low-quality feed has created various problems for the poultry industry resulting in poor performance and lower returns (Rafiullah and Abdul, 2011). In many animal production systems, approximately 2/3rd of improvements in livestock productivity can be attributed to improved nutrition (Manwar *et al.*, 2016). Hepatoprotection by conventional and synthetic drugs used in treating liver diseases are inadequate and sometimes can have serious side effects (Rao *et al.*, 2006). Without reliable liver-protecting drugs in modern medicine, many medicinal preparations in Ayurveda are recommended to treat liver disorders (Chatterjee, 2000). Inclusions of such herbal preparations in broilers ration have benefited growth and performance. Better performances were recorded in broilers by feeding herbal liver tonics (Tollba *et al.*, 2010)

GenoLiv, a hepatostimulant polyherbal formulation, consists of herbs, namely *Andrographis paniculata*, *Phyllanthus amarus*, *Boerhavia diffusa* and *Solanum nigrum* possessing hepatoprotective activity (Handa

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and Sharma, 1990; Raju *et al.*, 2003; Devaraj *et al.*, 2010; Subash *et al.*, 2011) and antioxidant activity (Olaleye *et al.*, 2010) which can tone up the liver of poultry birds for optimum performance and productivity. Keeping this in view, the present study was undertaken to evaluate the effect of GenoLiv on performance parameters, carcass characteristics, organ weight and immune status in commercial broilers.

MATERIALS AND METHODS

The study was conducted at Krantisinh Nana Patil College of Veterinary Science, Shirwal, Dist. Satara, Maharashtra Animal & Fishery Sciences University, Nagpur, India and sponsored by Avitech Nutrition Pvt. Ltd., Gurugram, Haryana, India. Total 180 day-old straight-run commercial broiler chicks of VenCobb 430-Y strain were used for a period of 35 days. The chicks were randomly divided into two groups: control (basal diet fed) and treatment (basal diet + GenoLiv @ 0.25 kg/MT feed, fed). Each treatment was subdivided into three replicates containing 30 birds in each. The Pre-starter, Starter and Finisher diets were fed to the birds for 0-10, 11-22 and 23 to 35 days of age, respectively. Under standard management practices, all the experimental birds were reared in deep litter open-sided poultry house. All the birds were vaccinated against Infectious Bursal Disease and New Castle Disease as per standard schedule. The parameters like body weight gain, feed consumption and feed conversion ratio (FCR) were recorded at weekly intervals and depicted for the overall period of experiment (0-5 weeks). The European production efficiency factor (EPEF) was calculated as per Mavromati *et al.* (2018).

$$\text{EPEF} = (\text{Livability (\%)} \times \text{live weight (kg)}) / (\text{age (days)} \times \text{FCR}) \times 100$$

Two birds per replicate were slaughtered (6 birds/treatment) at the end of the fifth week to study dressing parameters like Eviscerated yield, Giblet yield, Ready-to-Cook yield, and Breast meat yield. The percent abdominal fat pad was recorded at the end of the trial. The internal organs like liver, heart, gizzard, and spleen weights were recorded during slaughter. Haematological parameters, *i.e.*, complete blood counts, liver function enzymes like serum ALT (IU/L) and AST (IU/L) and serum biochemical parameters like calcium, phosphorus, glucose, total protein and albumin were determined at the end of the trial. The HI titres against ND were estimated at 28th day after vaccination of LaSota.

The data were analyzed statistically by analysis of variance to determine the means and standard error and their significance at $p < 0.05$ using Duncan's NMRT as per the methods described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The performance parameters, *viz.*, overall body weight gain, feed consumption and FCR of birds are shown in Table 1. There was no significant difference ($p > 0.05$) in the weight gain of the birds in the treatment group compared to the control. The data revealed that inclusion of GenoLiv in broilers' diet

increased the overall weight gain by 9.28%. There was no significant difference in the overall feed consumption of the GenoLiv fed birds compared to the control group. The overall FCR value after 5 weeks of the study duration was numerically improved in GenoLiv supplemented birds compared to the control (Table 1). There was a marked improvement in EPEF value in birds fed with GenoLiv mixed ration by 19.2% compared to the control group of birds.

In corroboration with our findings, Singh *et al.* (2009) noted positive effect on final body weights and lower FCR values in broiler chickens administered with the herbal liver stimulant compared with the control group. Moreover, Manwar *et al.* (2016) observed that liver stimulant-supplemented birds showed non-significant improvement in body weight during the entire experimental period compared to the control group. Similar results were reported by Sharma *et al.* (2008), who reported the efficacy of two herbal liver stimulant products (Superliv DS and Xlivpro) in broiler chickens. Both products contributed to an increase in the final body weights of birds and lower feed intake per kilogram of body weight gain. The body weight gain in GenoLiv supplemented birds may be attributed to the growth-promoting activity of its constituent herbs, *viz.* *Andrographis paniculata* (Mathivanan *et al.*, 2006).

The carcass parameters and organ weights are depicted in Table 2. The carcass characteristics eviscerated yield, giblet yield, dressing percentage and breast yield showed no noticeable changes among the control and treated birds. In agreement with the present study, Lipinski *et al.* (2019) stated that liver stimulant neither affected carcass dressing percentage nor the breast muscle yield.

The fat pad percentage was reduced by 11.25% in birds fed with a ration containing GenoLiv. As shown in Table 2, the weight of vital organs like the heart, gizzard and spleen exerted no marked difference among the broiler birds of both control and GenoLiv fed groups. However, the results showed an insignificant decrease in liver weight by 13.27% in birds fed with GenoLiv compared to control birds. Similar findings were reported by Sharma *et al.* (2008) in broiler chickens fed liver stimulant with a marked reduction in liver weight than control group. In the present study, liver weight tended to decrease in response to the herbal feed additive. Our results corroborate with the findings of Bhattacharyya *et al.* (2013), who observed enhanced activity of herbal liver stimulant under reduced welfare standards, resulting from liver overload due to an imbalance between dietary protein and energy intake.

Table 1: Overall (0-5 weeks) performance parameters of broiler chicken supplemented with polyherbal formulation GenoLiv

Group	Body weight gain (g)	Feed consumption (g)	FCR	EPEF	% Livability
Control	1584.34±75.46	2762.30±94.28	1.74±0.03	261.77±16.77	97.78
GenoLiv	1731.25±31.25	2822.91±45.83	1.63±0.03	312.02±10.79	100.00
t-cal	1.799	0.578	2.121	2.519	
p-value	0.146	0.594	0.101	0.065	



Table 2: Carcass characteristics and important organ weights (g) of the broilers supplemented with polyherbal formulation GenoLiv

Group	Eviscerated yield (%)	Giblet yield (%)	Dressing (%)	Breast yield (%)	Fat pad (%)	Liver weight (g)	Heart weight (g)	Gizzard weight (g)	Spleen weight (g)
Control	65.72±0.93	4.77±0.12	70.49±0.87	26.47±0.48	1.51±0.20	43.08±2.39	8.01±0.64	33.30±1.58	0.82±0.04
GenoLiv	65.41±0.70	4.58±0.15	70.00±0.58	26.12±0.64	1.34±0.19	37.36±1.24	8.87±0.86	35.35±2.00	0.88±0.03
t-cal	0.262	0.392	0.473	0.432	0.610	2.117	0.798	0.803	1.213
p-value	0.798	0.373	0.646	0.675	0.555	0.600	0.443	0.441	0.253

Table 3: Haematological parameters of broiler chicken supplemented with polyherbal formulation GenoLiv

Group	Hb (g/dL)	PCV (%)	MCV (fL)	MCHC (%)	TEC (10 ⁶ /mm ³)	TLC (10 ³ /mm ³)	H (%)	L (%)	M (%)	E (%)	B (%)
Control	9.88±0.48	28.83±2.02	76.23±2.87 ^a	34.60±1.0	3.82±0.32	18.90±2.41	34.00±2.22	58.83±2.65	1.66±0.55	4.16±0.30	1.33±0.49
GenoLiv	9.38±0.23	27.83±0.90	85.01±2.40 ^b	33.79±0.69	3.29±0.18	18.40±2.12	34.50±1.62	58.66±1.30	1.33±0.21	3.66±0.55	1.83±0.30
t-cal	0.924	0.451	2.339	0.668	1.432	0.156	0.182	0.056	0.559	0.785	0.859
p-value	0.377	0.662	0.041	0.519	0.183	0.879	0.860	0.956	0.588	0.451	0.411

Means bearing different superscripts within the column differ significantly ($p < 0.05$), TEC: Total Erythrocyte Count, TLC: Total Leukocyte Count, H: Heterophils, L: Lymphocytes, M: Monocytes, E: Eosinophils, B: Basophils

Table 4: Biochemical parameters of broiler chicken supplemented with polyherbal formulation GenoLiv

Group	AST (IU/L)	ALT (IU/L)	Total protein (g/dL)	Albumin (g/dL)	Glucose (mg/dL)	Phosphorus (mg/dL)	Calcium (mg/dL)
Control	209.23±4.30	22.94±2.39	5.02±0.31	2.67±0.19	237.78±11.94	4.54±0.53	8.44±0.59
GenoLiv	217.60±15.25	26.93±2.30	4.69±0.20	2.56±0.13	254.23±9.80	3.98±0.24	8.08±0.35
t-cal	0.528	1.200	0.870	0.648	0.708	0.946	0.367
p-value	0.609	0.258	0.405	0.642	0.312	0.522	0.613

No significant differences were observed in the haematological (Table 3) and serum biochemical parameters (Table 4), except MCV, which was significantly higher (85.01±2.40 vs. 76.23±2.87 fL) in the treatment than the control group. Haematological parameters remain unchanged, suggesting that GenoLiv is safe and has no harmful alterations in the birds. The results of the present study are well in confirmation with those reported by Manwar *et al.* (2016) that supplementation of herbal liver stimulant had no harmful effects in the biochemical parameters of commercial layer chickens.

The GenoLiv supplemented birds showed significantly ($p < 0.01$) higher HI titre (mean Log₁₀ antibodies/mL) as compared to the control birds (3.21±0.06 vs 2.91±0.06). The antibody titre was enhanced by 10.30% after GenoLiv treatment among the broiler birds. In corroboration with the present finding, improvement in antibody titre was also noted with herbal liver stimulant by Bhattacharyya *et al.* (2013).

CONCLUSION

In conclusion, GenoLiv as a feed additive in the commercial broilers' ration at a dose level of 0.25 kg/MT feed, positively influence the overall productive performance, immune status and livability of the birds. GenoLiv enhanced the weight gain by 9.28%, EPEF by 19.2%, improved FCR by 6.32% in broilers.

Moreover, GenoLiv reduced the fat pad by 11.25% illustrated by the increased lipid metabolism. Therefore, GenoLiv, a natural polyherbal hepatostimulant, could positively influence commercial broiler chicken's hepatic health and performance.

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