

Vying Efficacy of Livol, Livotal, and Hepato Promoter on Performance and Immune Response of Broiler

Sajid Hussain Qamar^{1*}, Ahsan ul Haq¹, Fawwad Ahmad¹, Shahid ur Rehman¹, Pervez Akhtar²,
Naeem Asghar¹, Ghulam Abbas¹

¹Department of Poultry Science, University of agriculture, Pakistan

²Department of Animal Breeding and Genetics, University of agriculture, Pakistan

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Abstract The aim of the present study was to compare the efficacy of commercial herbal products on performance and immune response of broiler. One hundred twenty chicks were randomly divided into 12 experimental units (replicates) having ten chicks each. These experimental units were allotted to four treatment groups (T₁, T₂, T₃ and T₄) such that each treatment has three replicates. Group T₁ was without supplementation of any commercial herbal product and served as control while the birds in group T₂, T₃ and T₄ were supplemented with commercial herbal products i.e. Livol, Livotal, and Hepato promoter @ 1 ml per 2 liter water, 1 ml per 4 liter water, 1 ml per 4 liter water respectively. Supplementation of different commercial herbal products by water during 2-5 weeks of age significantly (P<0.05), improved weight gain (6.36-12.37%), consumed less feed (2.62-3.09%) improved feed conversion ratio (9.53-14.29%) and lowest mortality rate (3.33%). Supplementation of different commercial herbal products exhibited non-significant effect on dressed weight, relative weight of heart, liver, spleen, gizzard, pancreas and intestine of broiler. However, ND and IBD antibody titer was improved significantly (p<0.05) (T₁). The birds using water supplemented with Hepatopromoter fetched the highest profit.

Keywords Livol, Livotal, And Hepato Promoter, Broilers, Performance, Immune Response, Growth Promoter

1. Introduction

Poultry meat is a very nutritive source of protein and other energetic nutrients that are long chain fatty acids, vitamin B complex, iron and zinc, which resulted in all over the world gradually acceptance of chicken meat and its products. Vitamins and minerals which are present in poultry meat help to boost the immune system, digestion, metabolic breakdown, development of healthy skin and

strengthen bones, build, maintain and repair body tissues. More Selenium is present in breast of chicken as compared to beef and lamb. Differences in nutritive values showed that there is a capability of chicken digestive system to take up cheap nutrients from feeds residues and deposit them in the high nutritive value meat.

Commercial poultry farming in Pakistan is challenged with many problems like Coccidiosis, salmonellosis etc. and huge losses due to contamination of feed with pathogenic bacteria and their related effects in birds, such as poor weight gain or even increased mortality are major obstructions in its progress [34]. To overcome these problems antibiotic have been used in poultry for the past four decades to improve growth performance of poultry and to protect them from the antagonistic effects of pathogenic and non-pathogenic enteric microorganisms. The total use of antibiotics as a growth promoter is estimated to be 4500 tons per year. But their usage in poultry industry is intensively controversial because the expansion of bacterial conflict and potential consequence on the human health [3,20,31].

Using antibiotics as growth promoters has remained under scrutiny for many years [30]. Present poultry industry is paying more attention towards addressing public concern for environmental and food safety issues. Therefore the non-recommended use of antibacterial in poultry feed has been restricted or completely banned. Sub-therapeutic levels of antibiotics have been prohibited by the European Union to avoid diseases resistance, initially with a ban on Avoparcin in 1997 followed by prohibition of virginamycin, bacitracin, spiramycin, and tylosine in 1999. European Union has strictly expelled the usage of antibiotic in poultry since January 2006. Therefore, antibiotics substitutes are of great interest to those associated with poultry industry. Herbs and herbal products, prebiotic, probiotic, enzymes, immune-modulators, microflora enhancers and organic acid should be taken into account as an alternative of antibiotics. [23,7,6,39,1629].

In such situations herbs, spices, and numerous plant extracts have received better attention as a probable

antibiotic growth promoter's replacement. As an alternative of antibiotic growth promoters medicinal plants are the most popular options. In these plants like neem, garlic, ginger, kalongi, turmeric, cumin, coriander, oregano, rosemary, sage, thyme, clove, mustard, cinnamon, savory, sea-buckthorn and mint etc. have been studied [8,25,3]. Which have showed positive effect. In these studies different parts of plants and their extracts viz. oil, leaves, bark, seed, roots and other vegetative parts etc. have been experimentally used in poultry species. Growth promotion, antibacterial, anti coccidial, anti-parasitic, anti-fungal, anti-tumor, anti-cancer, pesticide, immune booster and immunogenic properties of these candidate species have been investigated [38]. The World Health Organization considered that 80% of the earth's populations trust on traditional medicine for their prime healthcare, needs, and utmost of this therapy involves the use of numerous plant extracts or their active constituents [15,40].

Herbal medicines can be serve as safer alternatives as growth promoter due to their suitability and preference, lower cost of production, reduced mortality, reduced risk of disease, minimum health hazards and environment friendliness. Some medical companies have tried to prepare commercial herbal products which are in the market and needs different biological trails to test their claims. Some of the reports have demonstrated improvement with respect to final weight gain, feed efficiency, lowered mortality and increased livability in poultry birds [17,4]. Also such commercial herbals products preparations have shown beneficial effects against diseases due to feed contaminants like aflatoxin, toxicity caused by chemical drugs and fetch extra profit per bird [9]. Our country abounds in herbal wealth and innumerable plants which have interesting pharmacological properties which needs exploitation by the modern methods. Therefore, it is matter of interest to try some commercial indigenous medicinal products in poultry farming.

2. Materials and Methods

The research project was conducted at Poultry Research Center, University of Agriculture, Faisalabad during the month of March and April, 2014. One hundred and twenty day old broiler chicks were divided into 12 experimental units of 10 chicks each and were further allotted to five treatment groups (A, B, C, D and E) such that each group received three replicates. The chicks were raised in a room having 28 pens. The chicks under different experimental treatments were kept in separate pens measuring 5 x 3 x 2.5 feet, which were disinfected and white washed before the start of experiment. The birds were treated without or with supplementation of commercial herbal products (Table 2). Commercial herbal products composition used in experiment is shown in Table 1. The starter and finisher rations were fed *ad libitum* to all treatment groups, from 1-21 and 22-35 days of age, respectively. All the birds were kept under similar managemental conditions like space, light, temperature,

ventilation and relative humidity etc. All the birds were be vaccinated according to the recommended schedule.

The data regarding to initial body weight, weekly body weight gain, weekly feed consumption, feed conversion ratio (feed intake/weight gain), daily water intake, and mortality were collected to check performance of birds. The experiment was terminated at the age of 35 days. After which three birds/replicate were slaughtered by cutting the throat (Hallal method according to Islam) followed by complete bleeding. Live birds were weighed, slaughtered and scalded by immersing them into the water at temperature ranging from 180-190 F⁰ for half minute (Jull, 1976). After that, the birds were manually plucked by hanging them on shackles by their feet and obtained the minor body organs weight. The slaughtered birds were cut, opened and the offals were removed. The rest was taken as dressed weight. Blood samples (2 birds/ replicate) were collected at 28nd and 32th day of age to determine the immune response against the ND and IBD [21,32]. The results obtained from the trial were statistically analyzed [37].

Table 1. Composition of commercial herbal products used in experiment

Commercial Herbal Product	Product Composition
Livol (U.M. Enterprises)	<i>Solanum nigrum</i> , <i>Terminalia arjuna</i> , <i>Terminalia chebula</i> , <i>Andrographis paniculata</i> , <i>Withania somnifera</i> , <i>Azadirachta indica</i> , <i>Eucalyptus alba</i> , <i>Mangifera indica</i> , Betafin.
Livotal (Nawan Laboratories)	<i>Solanum nigrum</i> , <i>Mangifera indica</i> , <i>Andrographis paniculata</i> , <i>Withania somnifera</i> , <i>Eucalyptus alba</i> , <i>Terminalia arjuna</i> , <i>Terminalia chebula</i> , <i>Azadirachta</i> , Natural Betaine, Silymarin (Milk Thistle), Tamarix Gallica, Zarshak, Dhmasa, Swertia Charata Busch and HA, Halilah Siah.
Hepatopromoter (Forward Solutions)	<i>Cynara Scolymus L.</i> (Artichoke extract as major constituent in composition) Vit. B ₁ , B ₂ , B ₅ , B ₆ , B ₁₂ . (use as a preservative). Nicotinic acid, Biotin, inositol, choline chloride, sodium propionate, sodium sorbate, sorbitol. (as a inactive ingredients).

Table 2. Lay out of the experiment

Groups	Treatment
Group T ₁	Without commercial herbal product (control)
Group T ₂	Livol, (1 ml/2 liter)
Group T ₃	Livotal (1 ml/4 liter)
Group T ₄	Hepato promoter (1 ml/4 liter)

3. Results

Broiler Performance at Starter Phase (2nd to 3rd weeks)

Commercial herbal products showed significant effect (P > 0.05) on feed intake weight gain and feed conversion ratio (FCR) in broilers. Maximum weight gain was observed in bird of T₃ (Livotal), maximum value of feed

consumption during 2-3 weeks of age was observed in chicks under T₁ (control) whilst treatments T₂ (Livol) and T₃ (Livotal) exhibited best feed conversion ratio (Table 3).

Broiler performance at finisher Phase (4-5 weeks)

Commercial herbal products showed significant effect ($P > 0.05$) on feed intake weight gain and feed conversion ratio (FCR) in broilers. Maximum weight gain was noted in birds under treatment T₄ (Hepatopromoter) whilst birds under T₁ (control) consumed maximum feed as compared

to all other treatments. Broilers which were not given any herbal product poor feed conversion ratio (T₁) (Table 4).

Broiler Performance (Cumulative Phase)

Commercial herbal products showed significant effect ($P > 0.05$) on feed intake weight gain and feed conversion ratio (FCR) in broilers. Maximum weight gain was noted in birds of treatment T₄ (Hepatopromoter) whilst birds of group T₁ showed maximum feed consumption and poor FCR (Table 5).

Table 3. Comparative efficacy of commercial herbal products on weight gain, feed consumption and FCR of broilers during 2-3 weeks (8-21 days).

Parameters	Treatments				SEM	P value
	T ₁ (Control)	T ₂ Livol (1ml/2 liter)	T ₃ Livotal (1ml/4 liter)	T ₄ Hepato-promoter (1ml/4 liter)		
Number of chicks	30	30	30	30		
Days of starter phase	14 (2-3 weeks)	14 (2-3 weeks)	14 (2-3 weeks)	14 (2-3 weeks)		
Average initial Weight (g)per chicks	166.66	170.5	175.5	180.66		
Average Final live weight (g)per chicks at 22 day	806.96	881.5	888.3	879		
Average Weight gain (gm.)per chicks	640.3 ^b	711.5 ^a	712.8 ^a	699.0 ^a	11.6	0.05
Average Feed consumption (gm.)per chicks	1236.1 ^a	1196.5 ^b	1199.0 ^b	1198.7 ^b	5.2	0.001
FCR	1.93 ^a	1.68 ^b	1.68 ^b	1.71 ^b	0.03	0.006
Mortality	3.33	0	0	0		

^{a, b, c} column means with different superscripts differ significantly at ($p < 0.05$)

Table 4. Comparative efficacy of commercial herbal products on weight gain, feed consumption and FCR of broilers during 4-5 weeks (22-35 days).

Parameters	Treatments				SEM	P value
	T ₁ Control	T ₂ Livol (1ml/2liter)	T ₃ Livotal (1ml/4 liter)	T ₄ Hepato-promoter (1ml/4 liter)		
Number of chicks	30	30	30	30		
Day of finisher phase	22-35 (14days)	22-35 (14days)	22-35 (14days)	22-35 (14days)		
weight(g) per chicks at 22 day	806.96	881.5	888.3	879		
Final live weight (g)per chicks at 35 day	1748.66	1853.1	1905.6	1958.4		
Weight gain per chicks at 35 day	941.6 ^b	971.1 ^b	1018.3 ^{ab}	1078.8 ^a	19.5	0.03
Feed consumption (gm.)per chicks	2176.5 ^a	2110.7 ^b	2123.0 ^b	2124.5 ^b	8.4	0.003
FCR	2.3 ^a	2.1 ^{ab}	2.0 ^{bc}	1.9 ^c	0.04	0.01
Mortality (%)	3.33%	3.33%	0	3.33%		

^{a, b, c} column means with different superscripts differ significantly at ($p < 0.05$)

Table 5. Comparative efficacy of commercial herbal productson weight gain, feed consumption and FCR of broilers during 2-5 weeks (8-35 days).

Parameters	Treatments				SEM	P value
	T ₁ (Control)	T ₂ Livol (1ml/2 liter)	T ₃ Livotal (1ml/4 liter)	T ₄ Hepato-promoter (1ml/4 liter)		
No. of Chicks	30	30	30	30		
Days of experiment	28 days(2-5 week)	28 days(2-5 week)	28 days(2-5 week)	28 days (2-5 week)		
Initial weight (g) per chicks	166.66	170.5	175.5	180.66		
Final live weight (g)per chicks	1748.66	1853.1	1905.6	1958.4		
Weight gain (g)per chicks	1582.0 ^c	1682.6 ^b	1731.1 ^{ab}	1777.8 ^a	24.5	0.004
Feed consumption (g)per chicks	3412.6 ^a	3307.2 ^b	3322.0 ^b	3323.2 ^b	13.5	0.001
FCR	2.1 ^a	1.90 ^b	1.90 ^b	1.8 ^b	0.03	0.01
Mortality (%)	6.66%	3.33%	0	3.33%		

^{a, b, c} column means with different superscripts differ significantly at (p<0.05)

Table 6. Comparative efficacy of commercial herbal products on Average values of dressing percentage, relative giblet weights (g organ wt. /100g body wt.), spleen, pancreas and intestinal weight of broilers during 2-5 weeks (8-35 days).

Parameters	Treatments				SEM	P value
	T ₁ (Control)	T ₂ Livol (1ml/2 liter)	T ₃ Livotal (1ml/4 liter)	T ₄ Hepato-promoter (1ml/4 liter)		
Live Body weight(g)	1758.6	1859.1	1908.6	1956.6	24.3	0.002
Dressing percentage (g)	60.93	62.81	62.00	62.50	0.32	0.18
Liver weight (g)	2.15	2.15	2.35	2.32	0.03	0.10
Heart weight(g)	0.42	0.44	0.47	0.48	0.01	0.43
Gizzard weight(g)	1.56	1.64	1.64	1.62	0.01	0.43
Spleen weight(g)	0.14	0.15	0.16	0.15	0.009	0.91
Pancreas weight(g)	0.22	0.19	0.21	0.20	0.005	0.61
Intestinal weight(g)	2.86	3.40	3.39	3.31	0.09	0.13

NS=Non significant

Table 7. (GMT) Mean values of antibody titer against Newcastle disease (ND) and infectious bursal disease (IBD) when used different commercial herbal products from 8-35 days

Parameters	Treatments				SEM	P VALUE
	T ₁ Control	T ₂ Livol 1 ml/2 liter	T ₃ Livotal 1 ml/4 liter	T ₄ Hepatopromoter 1 ml/ 4 liter		
ND	51.33 ^b	81.33 ^{ab}	81.33 ^{ab}	102.67 ^a	6.8	0.02
IBD	40.66 ^b	57.66 ^{ab}	72.66 ^{ab}	94.00 ^a	7.5	0.04

Mean values with in the same row which have different superscripts, were significantly different (P<0.05)

Mortality

The total number of birds died during the study was four. Percent mortality in group T₁, T₂, T₃ and T₄ was 6.66%, 3.33%, 0% and 3.33% respectively. Whereas, no mortality occurred in group T₃ postmortem findings of all the dead birds revealed that mortality was due to heat stress because of electric failure.

Slaughter Data

Dressing Percentage

Statistical analysis of data showed non-significant effect of commercial herbal products on dressing percentage and minor body parts weight (Table 6).

Immune Response

Commercial herbal products revealed significant effect on immune response against Newcastle disease (ND) and infectious bursal disease (IBD). Maximum ND and IBD antibody titer was found in birds kept under treatment T₄ (Hepatopromoter).

4. Discussion

Broiler Performance

The results proved that Supplementation of commercial herbal products in broilers significantly ($p > 0.05$) improved the weight gain of the birds. These results are in line with the findings of Goodarzi *et al.* (2014); Pal. V *et al.* (2013); Sangoh and Park, (2012); Zanu *et al.* (2011) who reported that supplementation of neem, chicory, onion, garlic, ginger, anise and rosemary as a natural herbal growth promoters improved the weight gain of broilers [10,35,42]. The improvement in weight gain of the birds may be due to inhibition in growth of pathogenic bacteria such as *S. aureus*, *E. coli* and aflatoxin producing harmful microbes [11].

Supplementation of commercial herbal products showed a significant ($p < 0.05$) effect on the feed consumption of broiler. Result of the present trial are supported by the finding of Safamehr *et al.* (2013); Durani *et al.* (2008); Halle *et al.* (2005) [33,8,12]. Results are also compatible with Waldroup *et al.* (2013); Onu and Aniebo (2011) who reported a significant effect on feed consumption due to the dietary inclusion of Chicory, *Moringa olifera* supplemented as a natural herbal growth promoter in broiler ration [39,26]. Similar results have also been reported by Nasir (2001) and Osman and El- Barody (1999) when herbs were used in the rations of broilers and layers respectively [24,28].

Average improvement in feed conversion ratio of broilers was 9.53 to 14.29% by the use of commercial herbal products. The improvement in feed conversion ratio of the birds using herbal growth promoters in their rations may probably be due to the fact that active ingredients of herbal helps in suppressing growth of intestinal bacteria such as *S. aureus* and *E. coli* resultantly in better digestion and absorption [11]. The results are compatible with the findings of Mehmood *et al.*, (2009) and Ahmad (2005) who found better feed conversion ratio in broilers fed rations containing garlic and kalongi than those maintained on ration without it [22,2].

Slaughter Performance

Slaughter performance was measured in terms of dressing percentage, weights of intestine, spleen, pancreas and gizzard (heart, liver, and gizzard). Supplementation of commercial herbal medicine did not exhibit any effect on the dressing percentage values of the broilers in this study. Abbas (2010) reported non-significant effect of ginger, pepper, and curry leaf powder on dressed weight in broiler [1]. The result of the study are consistent with those observed by Ayssiwede *et al.* (2011); Osman *et al.* (2010); Ahmad (2005) and Soliman *et al.* (1999) who reported that the dietary inclusion of commercial herbal growth promoters containing herbal plants neem and turmeric did not exhibit any effect on the relative heart weight of broilers [4,27,2,36].

Immune response against Newcastle and infectious Bursal Diseases

Immune system is the most crucial system of the body that helps to maintain good health. It is made up of tissues, lymph nodes and cells, and is principally designed to kill infection causing organisms. When the immune system does not work properly then chances of disease outbreak increases which causes high economic losses. The results of this study proved that supplementation of commercial herbal medicine significantly increased the antibody titer of broilers against Newcastle disease (ND) and Infectious Bursal disease (IBD). The findings of the present study are in line with the findings of Landy *et al.* (2011); Zafar *et al.*, (2011); Hanieh *et al.* (2010), Ahmad (2005) Soliman *et al.* (1999) ; Haq *et al.* (1999) and Kyo *et al.* (2001) who reported a significant effect of natural herbal growth promoters on immune response of the broilers supplemented with kalongi neem, garlic, *Hypericum perforatum* extract and a herbal medicine Livol [21,41,13,2, 36,14,18] . Similarly Ahmad [2] also reported that supplementation of kalongi as herbal growth promoters showed a potential to be used as an alternative to antibiotics and vaccinations. Nidaullah *et al.* [25] concluded that aqueous extract of *Allium sativum* bulb (*Zingiber officinale*) and rhizome plays a very important role as immunostimulant against Coccidiosis, ND, IB and IBD; so, their results are in agreement with this study. The exact reason of improvements in immune response is not known. However, in this study improvement may be due to the polysaccharides and ether extracts of herbs such as neem, which have been found to cause hyperplasia of lymph-nodes and increased in the percentage of lymphocytes and neutrophils in blood. Ultimately these constituents improved the immunity against diseases and increased in the antibody titer, when subjected to vaccine (Hailat *et al.*, 2000). The results of the study are also in agreement with the findings of Meraj (1998) who reported significant improvements in antibody titers against Newcastle and infectious Bursal diseases by using neem and garlic in the broilers. Garlic also showed immune booster effect and caused increased immunity level against these diseases.

Economics of Production

Average production cost per bird in broiler kept under different treatment groups viz., T₁ (control), T₂ (Livol), T₃, (Livotal) and T₄ (Hepatopromoter) were Rs. 218.567, 220.82, 222.5 and 226.54 respectively (Table 8), excluding the cost of labor electricity charges and house rent because the experiment was conducted at the poultry Research Center, University of Agriculture, Faisalabad. Miscellaneous cost was calculated by including the estimated cost of litter, disinfectants and vaccination. The average weight gain in experimental groups T₁, T₂, T₃ and T₄ was 1582, 1682.6, 1731.1 and 1777.8 respectively. These broilers were sold at the rate of PRs. 140 per Kg. Profit per bird in the respective groups was found to be Rs., 2.92, 14.74, 19.85 and 22.35 respectively. Water supplementation of commercial herbal medicines was found to be more profitable than control. Broilers reared on **Hepatopromoter** fetched maximum profit as compared to other groups.

Table 8. Economics of broiler production kept under different treatment groups supplemented with different commercial herbal products from 8th to 35th day of age

Variables	T ₁ (Control)	T ₂ (Livol) 1ml/ 2 liter	T ₃ (Livotal) 1 ml/ 4 liter	T ₄ (Hepatopromoter) 1 ml/ 4 liter
Chick cost (Rs)	45	45	45	45
Total feed consumed/bird (Kg)	3.412	3.307	3.322	3.323
Feed cost/ Kg (Rs)	45	45	45	45
Feed cost/ bird (Rs.)	153.567	148.82	149.50	149.54
Medicine cost	0	7	8	12
*Miscellaneous charges/ bird (PRs.)	20	20	20	20
Total cost/ bird (Rs)	218.567	220.82	222.5	226.54
Average weight gain /bird (g.)	1582	1682.6	1731.1	1777.8
Sale price/ Kg live (Rs.)	140	140	140	140
Sale price/ bird (Rs.)	221.48	235.56	242.35	248.89
Net profit/ bird (Rs.)	2.92	14.74	19.85	22.35

* Miscellaneous includes brooding cost, cost of litter, disinfection and vaccination

5. Recommendations, Conclusions and Future Prospects

Based upon the results of the study, it may be concluded that supplementation of commercial herbal medicine to the broilers can improve efficiency of broiler's feed utilization resulting in to better growth. These findings will help the poultry makers to save expenditure from pocket snatching prices of antibiotics and will help in the production of organic broilers and save the health of mankind from ill effects of residual antibiotics present in the meat.

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