

ISSN 1682-8356
ansinet.org/ijps



INTERNATIONAL JOURNAL OF
POULTRY SCIENCE

ANSI*net*

308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

Effects of Superliv Concentrate on the Growth, Immunocompetence Traits and Nutrient Retention of Commercial Broilers During Extreme Winter

Amitav Bhattacharyya, Satish Kumar Garg, Vinod Kumar, Debashish Roy, K. Ravikanth and Shivi Maini
Pt. Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan,
Mathura-281001, Uttar Pradesh, India

Abstract: A study was conducted during the months of December-January involving sixty one week old broiler chickens, distributed into two experimental groups having three replicates of ten birds each. The birds of the first group were fed a basal diet (22.5% CP & 2830 K cal/kg ME) while the second group birds were fed a basal diet supplemented with a liver tonic, Superliv concentrate (Ayurved Limited product) @ 50g/quintal. Body weight gain was significantly higher ($P<0.05$) in the Superliv concentrate group compared to the control group at 2nd week, 3rd week, 4th week and 5th week of age. FCR was significantly higher ($P<0.05$) in the Superliv concentrate group than control group during 1-4 wk period (1.9 vs 2.1) and 1-6 wk period (1.97 vs 2.17). Total immunoglobulins and mercaptoethanol resistant (IgG) antibody titer (log 2) values in response to sheep red blood cells (SRBC) was significantly higher ($P<0.05$) in the Superliv concentrate group compared to the control group. Further, mercaptoethanol sensitive (IgM) antibody titer (log 2) values in response to sheep red blood cells (SRBC) were apparently higher in the Superliv concentrate group compared to the control group. Cell mediated immune (CMI) response (foot web index) was significantly higher ($P<0.05$) in the Superliv concentrate group compared to the control group. There was no significant difference in the nutrient retention between the Superliv concentrate group and control group. Hence, it may be concluded that Superliv concentrate may be added to broiler diet during winter to elicit growth performance and immunocompetence traits of commercial broilers.

Key words: Herbal supplementation, growth, immune response, nutrient retention

INTRODUCTION

Antibiotics have been used at sub therapeutic levels for promoting the growth and immunity of birds. The possibility of developing resistant bacteria besides other side effects when antibiotics are used as growth promoters in farm animals have led to ban on use of most antibiotics as growth promoters in many countries. Therefore, an intensive search for alternatives such as phytobiotics and other feed additives has started in the last decade. Phytobiotics are plant derivatives such as herbs, plant extracts or spices and have a wide range of activities such as stimulation of feed intake, growth and endogenous secretions in the gut. They act as immunomodulators resulting in decreased mortality and also have coccidiostatic, anti-microbial, anthelmintic and anti-inflammatory activities.

Liver is an important organ involved in various metabolic pathways regulating growth and productivity in poultry. As liver has a wide range of functions, it is vulnerable to various diseases. Phytobiotics possess hepato-protective and hepatogenic properties, which tone up liver resulting in increased nutrient utilization and better performance. Superliv concentrate contains herbs viz. *Achyranthes aspera* (Prickly Chaff Flower, Devil's Horsewhip, Apamarga), *Andrographis paniculata* (Green

chirayta, King of bitters, Kalamegha), *Azadirachta indica* (Neem), *Boerhaavia diffusa* (Spreading Hogweed, Punarnava), *Eclipta alba* (False Daisy, Bhringaraj), *Ichnocarpus frutescens* (Black creeper, Utpalagopa), *Terminalia chebula* (Black myrobalan, Haritaki). These herbs have hepato-stimulant, hepato-protective, immunomodulatory and antioxidant activities (Sadekar *et al.*, 1998; Manu and Kuttan, 2009; Michels *et al.*, 2011, Dash *et al.*, 2007). Further, they optimize digestion and metabolism resulting in better protein utilization, improved mucosal function and reduced cost of metabolic deamination. Andrographolide and 14-deoxy-11, 12-didehydroandrographolide isolated from *Andrographis paniculata* inhibits free radical activities and lipid peroxidation. Inhibition of lipid peroxidation in meat prevents free radical production thereby preserving meat composition, colour and improvement in shelf life. In addition, it has been studied that *Terminalia chebula* helps to reduce stress (Selvakumar *et al.*, 2007). Hence, a study was undertaken during the months of December-January to evaluate the efficacy of Superliv concentrate on the growth, immune response and nutrient retention of commercial broilers during extreme winter.

MATERIALS AND METHODS

Sixty day old commercial broiler chicks (Cobb 400) were procured from a reputed poultry farm after having vaccinated against the Ranikhet disease (F1 Strain).

Primarily, the chicks were wing banded and then kept in deep litter system under standard management and hygienic condition for one week. The chicks were given standard starter ration for first half of the week on plain paper and then in the chick feeder up to the end of the week. At the end of the first week, these chicks were weighed individually and randomly divided in to two groups, each consisting of three replicates and ten chicks in each replicate. The groups were formed on the basis of average uniform body weights, discarding the extreme ranges of body weights. The birds were housed in deep litter system. Water was offered *ad lib*. The control group birds were fed a basal diet (22.5% CP & 2830 K cal/kg ME) while the other group birds were fed a basal diet supplemented with a liver tonic, Superliv concentrate (Ayurvet Limited product) @ 50g/quintal. Weekly body weight gain and FCR during 1-6 weeks was determined. After 6 weeks of age, general immune response were studied by taking 10 birds from each treatment group and measuring important immunocompetence traits such as antibody response to SRBC (Siegel and Gross, 1980), 2-mercaptoethanol resistant antibodies (MER or IgG) and mercaptoethanol sensitive antibodies (MES or IgM) against SRBC (Martin *et al.*, 1989) and Cell mediated immune response (CMI) to PHA-P (Corrier and De Loach, 1990).

A metabolic trial was carried out after 6 weeks to study the effect of different feed additives on nutrient retention. Six representative birds of each group were housed individually in metabolic cages for 6 days and excreta of individual birds were collected. The feed intake and weight of excreta were recorded. Proximate analysis of the feed and excreta were done to estimate percent dry matter retention, percent crude protein retention, percent ether extract retention, percent calcium and phosphorus retention. All the data obtained were analyzed as per the standard statistical procedure (Snedecor and Cochran, 1994). Significant differences among treatment means were calculated as per DMRT test (Duncan, 1955).

RESULTS AND DISCUSSION

Body weight gain: Effect of Superliv concentrate on body weight gain of commercial broilers has been tabulated in Table 1. Body weight gain was significantly higher ($P<0.05$) in the Superliv concentrate group compared to the control group at 2nd week, 3rd week, 4th week and 5th week of age. Our present findings pertaining to Superliv concentrate addition in broiler feed are in agreement with the reports of Samarsinghe and Went (2002), Cooper and Washburn (1998), Austic (1985), Njokue (1986), Kutlu and Forbes (1993), McKee and Harrison

(1995) who also reported improvement in body weight gain when various herbs were added to broiler feed.

Feed conversion ratio: FCR was significantly higher ($P<0.05$) in the Superliv concentrate group than control group during 1-4 wk period (1.9 vs 2.1) and 1-6 wk period (1.97 vs 2.17) (Table 2). Rao *et al.* (1999) also concluded that administration of Zeetress, a polyherbal preparation containing *Withania somnifera*, *Ocimum sanctum*, *E. officinalis* had a positive effect on feed conversion in chicken. Samarsinghe and Went (2002) and Kumar *et al.* (2005) noted significant improvement in feed efficiency of the birds when the diet was supplemented with turmeric in broilers. Njoku (1986); Sahota *et al.* (1992); Anwar *et al.* (2004); Lohakare *et al.* (2004); Sahin *et al.* (2004) reported significant improvement in feed efficiency in the birds when purified diet was supplemented with amla/ascorbic acid in stress.

Immunocompetence traits: Total immunoglobulins (7.67 vs 6.33) and mercaptoethanol resistant (IgG) (4 vs 3) antibody titer (log 2) values in response to sheep red blood cells (SRBC) was significantly higher ($P<0.05$) in the Superliv concentrate group compared to the control group. Further, mercaptoethanol sensitive (IgM) (3.67 vs 3.33) antibody titer (log 2) values in response to sheep red blood cells (SRBC) were apparently higher in the Superliv concentrate group compared to the control group. This is in corroboration with the findings of various scientists who also noted that phytobiotics or herbal supplementation stimulate immune system and have potent antibacterial, antiviral, anti-inflammatory, coccidiostatic and anthelmintic activity. Further, it has already been reported that certain mushroom and herb polysaccharides can be used in prevention of bacterial (Yuan *et al.*, 1993), viral (Yu and Zhu, 2000) and parasitic disease (Pang *et al.*, 2000) in chickens.

Superliv concentrate contains herbs viz. *Andrographis paniculata*, *Boerhaavia diffusa* and *Eclipta alba* that have potent immunomodulatory activities (Puri *et al.*, 1993; Mathew and Kuttan, 1999; Manu and Kuttan, 2008; Mungantiwar *et al.*, 1999; Christyapita *et al.*, 2007). Hence, the humoral immune response was higher in the Superliv concentrate group.

Cell mediated immune (CMI) response (foot web index) was significantly higher ($P<0.05$) in the Superliv concentrate group compared to the control group (0.57 vs 0.45). Superliv contains *Boerhaavia diffusa* which modulates cell mediated immune response (Manu and Kuttan, 2008). Higher CMI response (foot web index) of commercial broilers at 6 weeks fed herbal supplements has also been reported by Tiwari (2008) and Goswami (2008).

Effect of Superliv concentrate on percent retention of dry matter, ether extract, crude protein, calcium and phosphorous of commercial broilers at 6 weeks of age

Table 1: Effect of various liver tonic products on the average weekly weight gain (g) of commercial broilers during 1-6 week period

Treatment	2nd wk	3rd wk	4th wk	5th wk	6th wk
Control	182.56±0.04 ^a	274.01±0.09 ^a	257.03±0.01 ^a	326.30±0.32 ^a	275.14±0.15
Superliv conc	191.11±0.33 ^b	286.30±0.87 ^b	315.14±0.99 ^b	366.30±0.72 ^b	272.36±0.50
Significance level	p<0.05	p<0.05	p<0.05	p<0.05	NS

Means bearing different superscripts within a column differ significantly (p<0.05); NS - Non Significant

Table 2: Effect of various liver tonic products on the FCR of commercial broilers during 1-4 week, 4-6 week and 1-6 week period

Treatment	1-4 wk	4-6 wk	1-6 wk
Control	2.1±0.02 ^a	2.17±0.14 ^a	2.17±0.01 ^a
Superliv Conc.	1.9±0.01 ^b	2.19±0.04 ^b	1.97±0.02 ^b
Significance level	p<0.05	NS	p<0.05

Means bearing different superscripts within a column differ significantly (p<0.05); NS - Non Significant

Table 3: Effect of various liver tonic products on the humoral immune responses (response to SRBC) and cell mediated immune response (response to PHA-P) at 6 weeks of age

Treatment	Total immunoglobulin	IgG	IgM	Foot web index (mm)
Control	6.33±0.05 ^a	3.00±0.05 ^a	3.33±0.09	0.45±0.01 ^a
Superliv Conc.	7.67±0.04 ^b	4.00±0.07 ^b	3.67±0.08	0.57±0.02 ^b
Significance level	p<0.05	p<0.05	NS	p<0.05

Means bearing different superscripts within a column differ significantly (p<0.05); NS - Non Significant

Table 4: Effect of various liver tonic products on percent retention of dry matter, ether extract, crude protein, calcium and phosphorous of commercial broilers at 6 weeks of age

Treatment	Dry matter (%)	Ether extract (%)	Crude protein (%)	Calcium (%)	Phosphorous (%)
Control	46.26±6.27	87.06±1.67	58.09±3.27	17.42±1.47	52.58±7.38
Superliv Conc.	42.53±3.90	82.52±1.07	58.78±5.62	14.78±3.75	30.41±1.53
Significance level	NS	NS	NS	NS	NS

NS -Non Significant

has been tabulated in Table 4. There was no significant difference in the retention of percent dry matter, percent crude protein, percent ether extract, percent calcium and phosphorus between the two treatment groups.

Conclusion: It has been well documented that responses to a growth promoter depend on a variety of factors viz. product composition, malnutrition, stress condition, health of birds, challenge from variant strains of pathogens etc. When these factors exist, the beneficial effects of a feed additive may be significant. The results obtained in the present study indicate that the addition of Superliv concentrate to the diets of broilers during extreme winter had a beneficial effect on growth and immunity. Hence, addition of Superliv concentrate to broiler diet @ 50g/quintal during winter may augment growth performance and immune response of commercial broilers.

REFERENCES

Anwar, B., S.A. Khan, A. Aslam, A. Maqbool and K.A. Khan, 2004. Effects of ascorbic acid and acetylsalicylic acid supplementation on the performance of broiler chicks exposed to heat stress. Pak. Vet. J., 24: 109-112.

Austic, R.E., 1985. Development and adaptation of protein digestion. J. Nutr., 115: 686-697.

Christyapita, D., M. Divyagnaneswari and R. Dinakaran Michael, 2007. Oral administration of *Eclipta alba* leaf aqueous extract enhances the non-specific immune responses and disease resistance of *Oreochromis mossambicus*. Fish Shellfish Immunol., 23: 840-852.

Cooper, M.A. and K.W. Washburn, 1998. The relationships of body temperature to weight gain, feed consumption and feed utilization in broilers under heat stress. Poult. Sci., 77: 177-187.

Corrier, D.E. and J.R. DeLoach, 1990. Evaluation of cell mediated, cutaneous basophil hypersensitivity in young chickens by interdigital skin test. Poult. Sci., 69: 403-408.

Dash, D.K., V.C. Yeligar, S.S. Nayak, T. Ghosh, D. Rajalingam, P. Sengupta, B.C. Maiti and T.K. Maity, 2007. Evaluation of hepatoprotective and antioxidant activity of *Ichnocarpus frutescens* (Linn.) R.Br. on paracetamol induced hepatotoxicity in rats. Trop. J. Pharma. Res., 6: 755-765.

Duncan, D.B., 1955. New multiple ranges and multiple F-tests. Biometrics, 11: 1-24.

Goswami, M., 2008. Effect of antibiotic and herbal supplement on the performance of commercial broilers, M.V.Sc. thesis submitted to U.P. Pt. Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go Anusandhan Sansthan, Mathura.

- Kumar, M., R.S. Choudhary and J.K. Vaishnav, 2005. Effect of supplemental prebiotic, probiotic and Turmeric in diet on the performance of broiler chicks during summer. *Int. J. Poult. Sci.*, 40: 137-141.
- Kutlu, H.R. and J.M. Forbes, 1993. Changes in growth and blood parameters in heat-stressed broiler chicks in response to dietary ascorbic acid. *Livestock Product Sci.*, 36: 335-350.
- Lohakare, J.D., B.J. Chae and T.W. Hahn, 2004. Effects of feeding methods (water vs. feed) of vitamin C on growth performance and carcass characteristics in broiler chickens. *Asian-Australasian J. Anim. Sci.*, 17: 1112-1117.
- Manu, K.A. and G. Kuttan, 2009. Immunomodulatory activities of Punarnavine, an alkaloid from *Boerhaavia diffusa*. *Immunopharmacol. Immunotoxicol.*, 31: 377-387.
- Manu, K.A. and G. Kuttan, 2008. *Boerhaavia diffusa* stimulates cell-mediated immune response by up regulating IL-2 and down regulating the pro-inflammatory cytokines and GM-CSF in B16F-10 metastatic melanoma bearing mice. *J. Exp. Ther. Oncol.*, 7: 17-29.
- Martin, A., W.B. Gross and P.B. Siegel, 1989. IgG and IgM responses in high and low antibody selected lines of chickens. *The J. Heredity*, 80: 249-252.
- Mathew, S. and G. Kuttan, 1999. Immunomodulatory and antitumour activities of *Tinospora cordifolia*. *Fitoterapia*, 70: 35-43.
- McKee, J.S. and P.C. Harrison, 1995. Effects of supplemental ascorbic acid on the performance of broiler chickens exposed to multiple concurrent stressors. *Poult. Sci.*, 74: 1772-1785.
- Michels, M.G., L.C. Bertolini, A.F. Esteves, P. Moreira and S.C. Franca, 2011. Anticoccidial effects of coumestans from *Eclipta alba* for sustainable control of *Eimeria tenella* parasitosis in poultry production. *Vet. Parasitol.*, 19: 177: 55-60.
- Mungantiwar, A.A., A.M. Nair, U.A. Shinde, V.J. Dikshit, M.N. Saraf, V.S. Thakur and K.B. Sainis, 1999. Studies on the immunomodulatory effects of *Boerhaavia diffusa* alkaloidal fraction. *J. Ethnopharmacol.*, 65: 125-131.
- Njokue, P.C., 1986. Effect of dietary ascorbic acid supplementation of broiler chickens in a tropical environment. *Anim. Feed Sci. Technol.*, 16: 17-24.
- Pang, F.H., M.Q. Xie and H.H. Ling, 2000. Effect of certain mushroom and herb polysaccharides in prevention of parasitic disease in chickens. *Chinese J. Vet. Parasit.*, 8: 1-3.
- Puri, A., R. Saxena, R.P. Saxena and K.C. Saxena, 1993. Immunostimulant agents from *Andrographis paniculata*. *J. Nat. Prod.*, 56: 995-999.
- Rao, N.R., C.B. Pande and Kiran, 1999. Effect of Zeetress on broiler performance. *Pashudhan*, 14: 4.
- Sadekar, R.D., A.Y. Kolte, B.S. Barmase and V.F. Desai, 1998. Immunopotentiating effects of *Azadirachta indica* (Neem) dry leaves powder in broilers, naturally infected with IBD virus. *In. J. Exp. Biol.*, 36: 1151-1153.
- Sahin, N., M. Onderci, K. Sahin, M.F. Gursu and M.O. Smith, 2004. Ascorbic acid and melatonin reduce heat induced performance inhibition and oxidative stress in Japanese Quails. *Br. Poult. Sci.*, 1: 116-122.
- Sahota, A.W., M.F. Ullah, A.H. Gillani and M.D. Ahmad, 1992. Effect of ascorbic acid supplementation on the performance of Lyalpur Silver Black and White Leghorn chicks exposed to heat stress. *Pak. Vet. J.*, 12: 28-31.
- Samarasinghe, K. and C. Went, 2002. Effect of herbs on performance of broilers. Page 116 in *Proc. 11th Eur. Poult. Conf.*, Bremen, Germany.
- Selvakumar, D., S.D. Rathinaswamy, S. Ramasundaram, M. Sundaramahalingam and T. Ramasundaram, 2007. Protective effect of Triphala on cold stress-induced behavioral and biochemical abnormalities in rats. *Yakugaku Zasshi.*, 127: 1863-1867.
- Siegel, P.B. and W.B. Gross, 1980. Production and persistency of antibodies in chickens to sheep erythrocytes. *Directional selection. Poult. Sci.*, 59: 1-5.
- Snedecor, G.W. and W.G. Cochran, 1994. *Statistical Methods*. 8th Edn., Oxford and IBH. Publishing Co., New Delhi.
- Tiwari, M., 2008. Effect of probiotic and herbal supplement on the performance of commercial broilers, M.V.Sc. thesis submitted to U.P. Pt. Deen Dayal Upadhyay Pashu Chikitsa Vigyan Vidyalaya Evam Go Anusandhan Sansthan, Mathura.
- Yu, J.G. and L.Y. Zhu, 2000. Effect of mushroom and herb polysaccharides in prevention of viral disease in chickens. *J. Trad. Chinese Vet. Med.*, 6: 3-4.
- Yuan, Y.L., B.T. Fan and Y.X. Zhang, 1993. Effect of certain mushroom and herb polysaccharides in prevention of bacterial disease in chickens. *J. Trad. Chinese Vet. Med.*, 3: 6-10.