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Growth Promoting Potentials of Indigenous Drugs in Broiler Chicken

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Abstract This study was conducted to explore the growth promoting potentials of indigenous drugs *viz*., *Glycyrrhiza glabra*, *Phyllanthus niruri* and *Aloe vera*. A total of seventy two straight run 1-day old broiler chicks (Cobb strain) were randomly allotted to 4 treatments with 3 replications of set 6 chicks in each. Treatments were included of control (T_1) and the inclusion of 1% of *Glycyrrhiza glabra* (T_2), *Phyllanthus niruri* (T_3) and *Aloe vera* (T_4) with basal diet. The results indicated that T_3 had a significantly higher body weight followed by T_4 and T_2. *A. vera* supplementation increased the feed intake significantly than other groups. Feed conversion efficiency was significantly higher with T_3 followed by T_4 and T_2. It is concluded that *P. niruri* and *A. vera* can be used as growth promoters at 1% level in feed.

Keywords *Broiler; Phyllanthus Niruri; Glycyrrhiza Glabra; Aloe Vera; Growth Performance*

1. Introduction

Intensive and scientific poultry rearing introduced the use of various growth promoters in feed to achieve the higher body weights at an early age. In previous years antibacterial drugs were tried to promote the growth. But facing the potential threats of drug residues in poultry meat and the resultant drug resistance in bacterial population causing diseases in both human and animals, the usage of these drugs in various countries have been banned. At this point of time the scientific and medical world has changed their notion on various herbal drugs and keeps trying these drugs for various ailments in humans as well as animals. Further public, academic and government interest in traditional medicines are growing exponentially due to the increased incidence of adverse drug reactions and economic burden of the modern system of medicine (Dubey, *et al*., 2004). WHO estimated that approximately 80% of the earth's inhabitants rely on traditional medicine for their primary health care needs, and most of this therapy involved the use of plant extracts or their active components. These plants and their components are perceived as natural and safe by consumers (Mehmet Ciftci, *et al*., 2005).

Glycyrrhiza glabra (Yasti-madu, Licorice) is a hardy plant growing well in deep, rich sandy soil and full sun. Dried liquorice roots are found in all the bazaars of India. *Glycyrrhiza* is documented for its anti-inflammatory, immune-stimulant, antiviral, demulcent, expectorant, anti-catarrhal, antiulcer (PUD), hepatoprotective, spasmolytic and laxative medicinal use (CSIR, 1985 and Nadkarni, 1996). Zhang QuiJun, *et al*., 2002 concluded that *Zengmiansan*, a traditional Chinese medicine consisting of 10 herbs including *Glycyrrhiza glabra* produced a positive effect on immunity and increased live weight gain.

Phyllanthus niruri (Bhoomyamalakee) prefers rocky, calcareous salts in humid tropical regions and usually found in central and southern India (CSIR, 1985 and Nadkarni, 1996). Haribabu and Panda (1993); Prajapati (1997); Gopinath, *et al*. (2001); Mihir Sarma, *et al*. (2001) and Dolly Bhaskar, *et al*. (2003) studied the effects of poly herbal formulations (containing *Phyllanthus* as one of the components) on growth performance of broilers and concluded that they improved weight gain.

Aloe vera (Ghrita-kumari) is cultivated throughout India in many varieties some of which run wild as on the coasts of Bombay, Gujarat and South India (CSIR, 1985 and Nadkarni, 1996). Many therapeutic properties of *A. vera* have been described (Grindlay and Reynolds, 1986) as anti-hyperglycaemic (Boudreau, 2006), anti-cancer (Steenkamp and Stewart, 2007), angiogenic and immune system stimulator (Sa, *et al*., 2005). Salary, *et al*., (2014) concluded that inclusion of 0.4 per cent *Aloe vera* extract in drinking water to broiler chicken had positive effects on performance.

In this juncture the present study is aimed at exploring the growth promoting potentials of crude powder of indigenous plant drugs *viz*. *Glycyrrhiza glabra, Phyllanthus niruri and Aloe vera* in commercial broiler chicken.

2. Materials and Methods

One day old broiler chicks of straight run, cob strain, purchased from a local hatchery were used for this experiment. On arrival, seventy two chicks were weighed, wing banded and randomly distributed to four groups (three replicates) of eighteen each. One group was assigned to basal diet only [Negative control (T_1)]. The other three groups were fed with basal diet supplemented (at the inclusion level of 1%) with *Glycyrrhiza glabra* crude powder (T_2), *Phyllanthus niruri* crude powder (T_3) and *Aloe vera* crude powder (T_4), obtained *as gratis* from M/s Dabur Ayurvet Ltd., New Delhi, India. All birds were fed with broiler starter (up to three weeks of age) followed by finisher mash (three to six weeks). Feed and water were offered *ad libitum* throughout the experiment. The birds were reared in table top broiler cages maintained in a gable roofed and open sided house. Uniform management conditions were maintained throughout the study period. The birds were immunized against Newcastle viral disease on day seven and twenty eight. The experimental design was approved by Institutional Animal Ethical Committee (IAEC).

Body weight and feed intake were recorded every week to measure production performance of birds. From the recorded data, weekly body weight gain and feed conversion efficiency of the birds were calculated.

Mortality was recorded daily throughout the study period.

All data were analyzed as per the methods of (Snedecor and Cochran, 1994).

3. Results and Discussion

The effects of supplementation of indigenous drugs on weekly body weight of birds and their weekly body weight gain are presented in Table 1 and 2 respectively.

Table 1: *Body Weight (In Gms)*

	T_1	T_2	T_3	T_4
1 day	48.8 ± 0.167	49.1 ± 0.179	48.8 ± 0.191	48.7 ± 0.135
7 days	162.8 ± 1.368^{A}	164.3 ± 0.709^{AB}	169.2 ± 0.550^{C}	167.2 ± 0.720^{BC}
14 days	388.7 ± 0.605^{A}	390.0 ± 2.254^{A}	396.7 ± 1.377^{B}	392.3 ± 1.355^{AB}
21 days	750.0 ± 6.458	747.2 ± 2.407	755.8 ± 0.809	752.7 ± 1.655
28 days	1107.5 ± 4.041^{A}	1129.3 ± 2.204^{B}	1158.0 ± 2.232^{C}	1137.2 ± 2.451^{B}
35 days	1545.7 ± 3.594^{A}	1554.8 ± 4.287^{A}	1622.5 ± 0.638^{C}	1604.7 ± 2.813^{B}
42 days	1966.3 ± 6.630^{A}	2005.5 ± 11.760^{B}	2059.2 ± 6.744^{C}	2044.5 ± 3.421^{C}

Values are Mean ± SE (n=18)
Means with different alphabets as superscripts between columns differ significantly (p<0.01)

Throughout the study period it is observed that the body weight of control birds (T_1) fed only with basal diet was lower compared to that of other groups supplemented with *Glycyrrhiza glabra* crude powder (T_2), *Phyllanthus niruri* crude powder (T_3) and *Aloe vera* crude powder (T_4) except on 21 days, in which it was able to match with other groups. Among the treated groups, *Phyllanthus niruri* supplemented group (T_3) topped the total body weight at 4, 5 and 6 weeks followed by *Aloe vera* and *Glycyrrhiza glabra* crude powder supplemented groups (T_4 and T_2). The final body weight of T_3 and T_4 were similar and significantly differed from T_2 and T_1.

Table 2: *Weekly Body Weight Gain (In Gms)*

	T_1	T_2	T_3	T_4
1st week	114.0 ± 1.455^{A}	115.2 ± 0.761^{AB}	120.4 ± 0.525^{C}	118.4 ± 0.805^{BC}
2nd week	225.8 ± 1.014	225.7 ± 1.898	227.5 ± 1.661	225.2 ± 0.954
3rd week	361.3 ± 6.315	357.2 ± 1.581	359.2 ± 1.396	360.3 ± 2.117
4th week	357.5 ± 9.150^{A}	382.2 ± 3.698^{B}	402.2 ± 2.447^{C}	384.5 ± 1.655^{BC}
5th week	438.2 ± 3.976^{A}	425.5 ± 5.374^{A}	464.5 ± 1.872^{B}	467.5 ± 2.622^{B}
6th week	420.7 ± 5.158	450.7 ± 12.504	436.7 ± 7.040	439.8 ± 1.133

Values are Mean ± SE (n=18)
Means with different alphabets as superscripts between columns differ significantly (p<0.01)

While analyzing the weekly body weight gain achieved by birds, it further supported the incremental body weight gain achieved by T_3 and T_4 at 1, 4 and 5 weeks, which was significantly higher. *Glycyrrhiza glabra* treated group (T_2) also could catch up weight gain in the last week, though it was not significant.

Table 3: *Cumulative Feed Intake (In Gms)*

	T_1	T_2	T_3	T_4
1st week	112.0 ± 0.577	111.7 ± 0.882	113.0 ± 1.000	113.0 ± 0.577
2nd week	409.0 ± 1.528^{A}	408.3 ± 1.667^{A}	416.7 ± 1.667^{B}	419.3 ± 0.882^{B}
3rd week	910.0 ± 2.887^{A}	910.0 ± 2.887^{A}	920.0 ± 2.887^{AB}	926.3 ± 1.202^{B}
4th week	1571.7 ± 4.410^{A}	1576.7 ± 1.667^{AB}	1586.3 ± 1.856^{B}	1590.0 ± 2.887^{B}
5th week	2486.7 ± 4.410^{A}	2490.0 ± 2.887^{A}	2494.7 ± 1.856^{A}	2516.3 ± 4.096^{B}
6th week	3563.3 ± 6.009^{A}	3558.3 ± 4.410^{A}	3578.7 ± 1.856^{A}	3601.7 ± 4.410^{B}

Values are Mean ± SE (n=18)
Means with different alphabets as superscripts between columns differ significantly (p<0.01)

Throughout the experiment cumulative feed intake was significantly high in group supplemented with *Aloe vera* (T_4) when compared to control. There was no significant difference in feed intake between control (T_1) and *glycyrrhiza* supplemented group (T_2). *Phyllanthus* supplementation (T_3) has shown significant increase in cumulative feed intake only at 2nd and 4th weeks when compared to control, similar to T_4 (Table 3).

This reflected as better feed conversion efficiency in T_3 followed by T_4 and T_2, and finally T_1 (Table 4).

Table 4: *Feed Conversion Efficiency*

	T_1	T_2	T_3	T_4
1st week	0.982 ± 0.005^{B}	0.969 ± 0.008^{AB}	0.939 ± 0.007^{A}	0.954 ± 0.005^{AB}
2nd week	1.204 ± 0.005^{a}	1.198 ± 0.004^{a}	1.198 ± 0.005^{a}	1.220 ± 0.003^{b}
3rd week	1.298 ± 0.004^{a}	1.304 ± 0.004^{a}	1.301 ± 0.004^{a}	1.316 ± 0.002^{b}
4th week	1.484 ± 0.004^{C}	1.460 ± 0.002^{B}	1.430 ± 0.002^{A}	1.461 ± 0.003^{B}
5th week	1.661 ± 0.003^{C}	1.654 ± 0.002^{C}	1.585 ± 0.001^{A}	1.617 ± 0.003^{B}
6th week	1.858 ± 0.003^{D}	1.819 ± 0.002^{C}	1.780 ± 0.001^{A}	1.805 ± 0.002^{B}

Values are Mean ± SE (n=18)

Means with different alphabets (capitals) as superscripts between columns differ significantly ($p<0.01$)

Means with different small alphabets as superscripts between columns differ significantly ($p<0.05$)

Ultimately the results of the present study show that *Phyllanthus niruri* has improved the broiler performance by increasing the body weight without affecting feed intake, which was followed by *Aloe vera* which simultaneously increased body weight along with feed intake. *Glycyrrhiza glabra* improved performance of broilers as seen with increase in body weight and FCE with no alteration in feed intake when compared to control. Contrary to the findings of the present study, Nguyen Hieu Phuong and Nguyen Quang Thieu reported that using different levels (0.25 to 1.5%) of *Phyllanthus amarus* powder in the diets had no effects on the growth performance of chicken. But, Natsir, *et al*. (2013) suggested that 0.8 per cent encapsulated combination of garlic and *Phyllanthus niruri* in broiler diet improved performance. Sedghi, *et al*. (2010) recorded that dietary licorice extract supplementation did not have any negative effects on body weight or FCR of broiler chicken. The result of other study using licorice extract through drinking water indicated no considerable effect on broilers' growth performance (Naser Moradi, *et al*., 2014). Mimereole (2011) in the evaluation of the dietary inclusion of *Aloe vera* as an alternative to antibiotic growth promoter in broiler production concluded that as a growth promoter, *A. vera* was comparable to antibiotic growth promoters. Salary, *et al*. (2014) found that the inclusion of licorice and *A. vera* extracts at the levels of 0.4 per cent in drinking water have positive effects on the performance of broiler chicken.

4. Conclusion

It can be concluded that use of *Phyllanthus niruri* and *Aloe vera* at 1% inclusion level as crude powder had positive effects on growth performance of broilers. Based on the observations with *G. glabra*, it is suggested to conduct further studies to identify the inclusion level.

References

Boudreau, M.D. *An Evaluation of Biological and Toxicological Properties of Aloe Barbandesis (Miller), Aloe Vera.* J. Environment. Sci. Health. 2006. 24; 103-154.

Council for Scientific and Industrial Research (CSIR), 1985: The Wealth of India. A Dictionary of Indian Raw Materials and Industrial Products. Raw Materials: Vol. 1, 191-194; Vol. 4, 151-154 and 305-307. National Institute of Science Communication and Information Resources, CSIR. New Delhi.

Dubey, N.K., Kumar, R., and Tripathi, P. *Global Promotion of Herbal Medicine: India's Opportunity.* Curr. Med. 2004. 86; 37-41.

Gopinath, C.R., Gowdh, C.V., Devegowda, G., and Umakantha, B. *Studies on Supplementation of Livfitvet to Alleviate the Effect of Aflatoxin in Broilers Diet.* Indian J. Poult. Sci. 2001. 36 (1) 50-53.

Grindlay, D., and Reynolds, T. *The Aloe Vera Phenomenon: A Review of the Properties and Modern Uses of the Leaf Parenchyma Gel.* J. Ethnopharmacol. 1986. 16; 117-151.

Hari Babu, Y., and Panda, B.K. *Immunostimulating Effect of Livol Against New Castle Disease Virus in Chicken.* Indian J. Indg. Med. 1993. 10; 9-21.

Mehmet Ciftci, Talat Guler, Bustami Dalkilic and O., Nihat Ertas. *The Effect of Anise Oil (Pimpinella anisum L.) on Broiler Performance.* Int J of Poult Sci. 2005. 4 (11) 851-855.

Mihir Sarma, Sapcota, D., Dutta, K.K., and A.K. Gohain. *Effect of Dietary Supplementation of Herbal Products on the Performance of Broilers*. Indian J. Poult. Sci. 2001. 36 (2) 235-236.

Mimereole, F.U.C. *Evaluation of Dietary Inclusion of Aloe Vera an Alternative to Antibiotic Growth Promoter in Broiler Production.* Pakistan Journal of Nutrition. 2011. 10 (1) 1-5.

Nadkarni, K.M., 1996. Indian Materia Medica Vol. 1 & 2. Popular Prakasan Pvt. Ltd., Mumbai. 76-77; 582-584 and 947-949.

Naser Moradi, Shahab Ghazi, Tahereh Amjadian, Hassan Khamisabadi and Mahmood Habibian. *Performance and Some Immunological Parameter Responses of Broiler Chickens to Licorice (Glycyrrhiza Glabra) Extract Administration in the Drinking Water*. Annual Research and Review in Biology. 2014. 4 (4) 675-683.

Natsir, M.H., Hartulik, O., Sjofjan and E., Widodo. *Effect of Either Powder or Encapsulated form of Garlic and Phyllanthus niruri L. Mixture on Broiler Performances, Intestinal Characteristics and Intestinal Microflora.* International Journal of Poultry Science. 2013. 12 (11) 676-680.

Nguyen Hieu Phuong and Nguyen Quang Thieu. *Effect of Adding Different Phyllanthus Amarus Powder Concentrations in Chicken Diet on Their Growth Performance and Health.* Proceedings of the International Conference Livestock-Based Farming Systems, Renewable Resources and the Environment. 6-9 June 2012, Dalat, Vietnam.

Prajapati, K.S. *Effect of Supplementation of Livfit Vet Premix on Performance of Broilers.* Indian J. Poult. Sci. 1997. 32 (1) 86-88.

Sa, I.M., Oh, S.T., Song, S., Kim, M.R., Kim, D.S., Woo, S.S., Jo, T.H., Park, Y.I. and Lee, C.K. *Identification of Optimal Molecular Size of Modified Aloe Polysaccharides with Maximum Immunomodulatory Activity.* Intern. Immunopharm. 2005. 5; 271-9.

Salary, J., Kalantar M., Sahebi ala M., Ranjbar K., and Hemati Matin, H.R. *Drinking Water Supplementation of Licorice and Aloe Vera Extracts in Broiler Chickens.* Scientific Journal of Animal Science. 2014. 3 (2) 41-48.

Sedghi, M., Golian A., Kermanshahi H., and Ahmadi H. *Effect of Dietary Supplementation of Licorice Extract and a Prebiotic on Performance and Blood Metabolites of Broilers*. South African Journal of Animal Science. 2010. 40 (4) 371-380.

Snedecor, G.W., and Cochran, W.G., 1994: *Statistical Methods*. 8th Ed., Iowa State University, Ames, Iowa.

Steenkamp, V., and Stewart, M.J. *Medicinal Applications and Toxicological Activities of Aloe Products.* Pharmaceut. Biol. 2007. 45; 411-420.

Zhang QuiJun, Liu XuDong, Kang ZhiYong, Cui HongYu, Wang AlHua and Yang YuCheng. *Influence of Zengmiansan on Immunity and Liveweight Gain of Chicks.* Chinese Journal of Veterinary Medicine. 2002. 28 (1) 35.