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Effect of Dietary Supplementation of Sea Buckthorn Leaf Meal on Egg Production Performances by Coloured Breeder Birds During Summer Season

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Abstract

The present experiment was conducted to study the effect of sea buckthorn leaf meal (SBTLM) supplementation on hen house and hen day egg production in ninety coloured Chabro adult breeder hens and 18 viable cocks in 1:5 sex ratio were randomly distributed into three dietary treatment groups: Control (Basal), standard breeder diet (BIS, 2007); basal+ 0.5% and basal+1.0% SBTLM. The average egg production during 5th week were significantly higher ($p<0.01$) in basal diet+1.0% SBTLM supplemented group (72.86) as compared to basal diet+0.5% SBTLM and control or basal diet groups (56.67 and 62.3). However, during 11th and 12th week of experimental feeding, the weekly hen house egg production were significantly higher ($p<0.01$) in both the SBTLM supplemented groups than the control group. The overall egg production up to the 12th week of experimentation were significantly higher ($p<0.01$) in basal diet +1.0% SBTLM supplemented groups as compared tocontrol group. During the experimental study period, there was no mortality in any treatment group. Hence, the hen day egg production per week and phase wise hen day egg production per week was equal to the hen house egg production per week and phase wise egg production per week, respectively.

Keywords: Coloured chicken; Breeder; Chabro and sea buckthorn.

Introduction

Poultry meat and eggs are the cheapest and best source of quality animal protein. Impressive growth has been achieved in commercial poultry farming but the rural poultry sector remains unchanged. Due to limited feed resources and changing agro climatic conditions of our country, backyard poultry happens to be best viable alternative to ensure nutritional security and agricultural sustainability by utilizing locally available resources. The impressive growth in poultry industry is the result of

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technological breakthrough in feeding, breeding, management and health care (Pathak *et al.,* 2015). The World Health Organization estimated that approximately 80% of the earth's inhabitants rely on traditional medicines for their primary health care needs as well as to improve the productive and reproductive performances of poultry. Herbal medicines may serve as safer alternatives as growth promoters due to their suitability and preference, lower cost of production, improved feed efficiency, fast growth, reduced mortality, reduced risk of diseases, minimum health hazards and environmental friendliness. Sea buckthorn (*Hippophae rhamnoides* L.), a unique and valuable plant has gained worldwide attention, mainly for its medicinal and nutritional potential (Nazir *et al.,* 2017). Sea buckthorn is a thorny, dioecious, wind pollinated, multipurpose temperate bush plant bearing yellow or orange berries with nitrogen fixing abilities. It is commonly known as "cold desert gold" due to its various beneficial effects over plant, animal, human & soil health. Sea buckthorn is a small shrub comprising of fruit and leaves that are rich in nutrients and bioactive components such as vitamins (Kudritskaya *et al*., 1989), amino acids (Repyakh *et al*., 1990), lipids (Goncharova and Glushenkova, 1993), sugars and acids (Yang, 2009), and flavonoids (Häkkinen *et al*., 1999). Studies have shown that the leaves and fruit residues of sea buckthorn could be used to feed poultry and livestock without the accumulation of toxins, and that the feed also had a stimulating effect on growth and performance of poultry and livestock (Liu *et al.,* 1989). The leaves of SBT are very nutritious and can be fed to the livestock and poultry after value addition. As protein is the most expensive nutrient, by introducing new protein source in breeder diet, we can certainly decrease the cost of production and increase the profit per birds leading to socio-economic up-liftment of poultry farmers during intense summer season.

Materials and Methods

Ninety coloured chicken breeder (Chabro) hens and eighteen viable cocks were obtained from the Poultry farm of the U.P. Pandit Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan, Mathura. These birds were randomly distributed into three treatment groups having three replicates of 10 hens and 2 cock each of uniform age, production and in good health condition. The basal/control group was kept on standard breeder diet (BIS, 2007) and other two treatment groups were supplemented with 0.5% and 1.0% sea buckthorn leaf meal (SBTLM). These breeder birds were reared under deep litter system and standard managemental conditions. Throughout the experimental period the birds were offered fixed weighed quantity (110 g/day) feed (adequate in all nutrients) as per BIS (2007) and water *ad lib*.

Results

The average morning, afternoon and evening Temperature Humidity Index (THI) values ranged from 79.07 to 83.70, 84.83 to 88.79 and 82.72 to 87.14, respectively up to twelve weeks of experimentation. The average minimum and maximum temperature (^{o}C) up to twelve week of experimentation ranged from 21.21 to 25.07 and 36.86 to 41.23, respectively.

The average egg production during 1st week of experimentation was 63.33, 62.86 and 62.38, while at the end of 12th week of experimentation was recorded as 49.05, 58.09 and 57.62 in basal diet, basal diet + 0.5% SBTLM and basal diet + 1.0% SBTLM dietary groups respectively. There were no significant differences in average hen house egg production during 1st, 2nd, 3rd, 4th and 6th to 8th week of experimentation among various dietary treatment groups. However, during 11th and 12th week of experimental feeding, the weekly hen house egg production was significantly higher ($p<0.01$) in both the SBTLM supplemented groups than the control group fed the basal diet. The average hen house egg production during 5th week was 56.67, 62.38 and 72.86, during 11th week was 56.67, 62.38 and 72.86 while in 12th week of experimentation 49.05, 58.09 and 57.62, respectively in basal diet, basal diet + 0.5% SBTLM and basal diet + 1.0% SBTLM dietary groups dietary of breeder birds (Table 1).

The overall hen house egg production in basal diet + 1.0% sea buckthorn leaf meal supplemented groups (67.70) were significantly higher ($p < 0.05$)

Hen day egg production per week

During the experimental study period, there was no mortality in any treatment group. Hence, the hen day egg production per week and phase wise hem day egg production per week was equal to the hen house egg production per week and phase wise egg production per week, respectively.

Table 1: Effect of dietary supplementation of sea buckthorn leaf meal on the average weekly hen house egg production (HHEP) of breeder birds during summer season

Treatments	Weeks												
	1	2	3	4	5	6	7	8	9	10	11	12	0-12
Basal diet	63.33	60.95	62.86	79.05	56.67a	55.71	55.24	55.24	53.33	57.14	56.67a	49.05a	57.10a
Basal diet + 0.5% SBTLM	62.86	64.76	67.14	66.67	62.38a	60.95	61.90	62.38	61.90	64.29	66.19b	58.09b	63.29ab
Basal diet + 1.0% SBTLM	62.38	66.67	70.48	72.38	72.86b	65.72	69.52	68.57	64.76	68.57	72.86b	57.62b	67.70b
SEM	1.21	2.16	2.15	2.48	2.62	2.81	2.96	3.01	2.74	2.18	2.66	1.69	1.89
Sig. Level	NS	NS	NS	NS	P<0.01	NS	NS	NS	NS	NS	P<0.01	P<0.01	P<0.05

Means bearing different superscripts within a column differ significantly ($p < 0.01$)

NS: Not significant ($p > 0.05$) SEM: Pooled standard error of means

SBTLM: Sea buckthorn leaf meal

Discussion

The basal diet + 1.0% SBTLM supplemented group had significantly better ($p < 0.05$) hen house egg production as compared to control group during phases of 4-8 weeks, 8-12 weeks and 0-12 weeks (Overall). In addition, it was also observed that basal diet + 1.0% SBTLM supplemented group had significantly better ($p < 0.05$) response in phase wise hen house egg production as compared to basal diet + 0.5% SBTLM group, while it was lowest in control group. The increase in hen house egg production could be due to the supplementation of sea buckthorn leaves, rich in nutrients and bioactive components such as vitamins, amino acids, lipids, flavonoides, higher content of essential oils and have as anti oxidant properties.

The results obtained in the present study fall in line with the findings of Wang (2007), Dumbrava *et al.* (2006), Singh and Sharma (2008), Ambatkar (2009), Biswas *et al.* (2010) Chand *et al.* (2018) and Shaker *et al.* (2018). Hasanuzzaman (2011) observed that egg production of layers were higher after replacing CP content of ration up to 20% by sea buckthorn cake. On contrary Rao *et al.* (2011), Latshaw and Zhao (2011) reported that changes in the level of protein in diet did not affect the rate of egg production and egg mass.

Conclusion

The leaves, seeds and fruit residues contains high crude protein, amino acid, calcium and phosphorus, they have advantages as basic materials for feed formulations for poultry. Due to presence of several nutritional and bio active compounds in fruit, leaves, seed oil and cakes of sea buckthorn, it serves as good growth promoter as well as enhance egg productivity. It was found that the basal diet + 1.0% SBTLM supplemented group had significantly higher ($p < 0.05$) hen house and hen day egg production as compared to control group during different weeks and overall experimental period.

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Conflict of interest

The authors declare no conflicts of interest

References

1. Ambatkar Shashwati, K. Evaluation of sea buckthorn leaves (*Hippophae* l.) As protein replacer for efficient broiler production. Part of M.V.Sc. thesis submitted to Choudhary Sarwan Kumar Himachal Pradesh Krishivishvavidyalaya Palampur- 176 062 (H.P.) India. 2009.
2. BIS. 2007. Bureau of Indian standards. Poultry feeds-specifications (fifth revised edition) IS-1374.
3. Biswas, A.; Roy, B.G.; Gogoi, D.; Ahmed, M. and Singh, S.B. Poultry farming in the cold, arid, Himalayan region of India. *World's Poultry Science Journal*, 2010;66:297-307.
4. Chand, Naila; Naz, Shababa; Irfan, Muhammad; Khan, Rifat Ullah and Rehman Ziaur. Korean J Food Sci Anim Resour., 2018;38(3):468–75.
5. Dumbrava, D.; Matiuti, M.; Druga, M.; lupea, A.; Ianculov, I.; Clep, C. Effect of sea buckthorn berry flour from hens food on egg yolk carotenoids pigments content. Ann Facul Eng Hunedoara TOME, 2006;4:156–60.
6. Goncharova, N.P. and Glushenkova, A.I. Lipids of the leaves of Central Asian forms of sea buckthorn. Chemical Nat. Compound. 1993;33:797-798.

7. Häkkinen, S.H.; Kärenlampi, S.O.; Heinonen,. IM.; Mykkänen, H.M. and Törrönen A.R. Content of the flavonols quercetin, myricetin, and kaempferol in 25 edible berries. Journal of Agriculture Food Chemistry, 1999;47:2274–79.
8. Hasanuzzaman, M.D. Effect of feeding sea buckthorn cake {*Hippophae* L.) on egg production in poultry and growth in calves. Ph.D Thesis, department of Animal nutrition, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, HP. India. 2011.
9. Kudritskaya, S.E.; Zagorodskaya, L.M. and Shishkina, E.E. Carotenoids of the sea buckthorn, variety Obil'naya. Chemical Nat Compound. 1989;25:724–725.
10. Latshaw, J.D. and Zhao, L. Dietary protein effects on hen performance and nitrogen excretion. Poult Sci. 2011;90:99–106.
11. Liu, D.; Zhang, H.; Zhang, S.; Kou, X.; Liu, R. and Wang, S. A food additives "sea buckthorn yellow". Proceedings of international symposium on sea buckthorn (H. rhamnoides L.), Xian, China, 1989 Oct 19–23.pp.318−319.
12. Nazir, Fiza; Salim, Rehana and Bashir Mohsin. Chemical and antioxidant properties of Sea buckthorn (*Hippophae rhamnoides*). *The Pharma Innovation Journal*, 2017;6(12):173-76.
13. Pathak, G.P.; Sharma, N.; Mane, B.G.; Sharma, D.; Krofa, D. and Khurana S.K. Effect of sea buckthorn (*Hippophae rhamnoides*) leaves, pulp & oil on growth performance, carcass characteristics and meat quality of broilers chickens. Journals of poultry science & technology. 2015;3(1):20-23.
14. Rao, R.S.V.; Ravindran, V.; Srilatha, T.; Panda, A.K. and Raju, MVL.Effect of dietary concentrations of energy, crude protein, lysine and methionine on the performance of white leghorn layers in the tropics. Journal of Appl. Poult. Res. 2011;20:528–41.
15. Repyakh, S.M.; Kargapol'tsev, A.P.; Chuprova, N.A. and Yushipitsina, G.G. Amino acid composition and biological value of proteins of the woody verdure of sea buckthorn. Chemical Nature of Compound. 1990;26:110–11.
16. Shaker, Mohamed Momani; Al-Beitawi, Nafez A; Bláha Jan and Mahmoud, Ziyad. The effect of sea buckthorn (*Hippophae rhamnoides* L.) fruit residues on performance and egg quality of laying hens. 2018;46(1):422-26.
17. Singh, V. and Sharma, V.K. Role of sea buckthorn (*Hippophae rhamnoides* L.) in Development of Animal Husbandry. In: Sea buckthorn (*Hippophae* L.) A Multipurpose Wonder Plant. Vol. Ill: Advances in Research and Development (Virendra Singh *ed.*), 2008.pp.524-39.
18. Yang, B. Sugars, acids, ethyl β-D-glucopyranose and a methyl inositol in sea buckthorn (*Hippophae rhamnoides*) berries. Food Chemistry. 2009;112:9–97.