

Feeding of sea buckthorn leaf meal in poultry: an overview

Abstract

In recent years, one of the most promising approaches has been the exploration of the power of the nature i.e. herbs, shrubs and trees. Sea buckthorn (*Hippophae rhamnoides*) (SBT) is a naturally growing shrub. The leaves, stems, tubers, roots as well as blossom of sea buckthorn contain a high content of ascorbic acid (vitamin C) and also carotenoids, polyphenols, flavonoids, tocopherols, alkaloids, chlorophyll derivatives, amino acids and amines. The present review reflects on the few studies undertaken on SBT leaf meal to modulate growth and immunity in chicken. However, there is a need for comprehensive studies in different species of poultry validating its dose and mode of action in poultry.

Keywords: sea buckthorn, poultry, feed, growth, immunity

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Introduction

Over the past few decades, antibiotics were used to increase the productivity of the birds. However, the ban on the sub therapeutic level of antibiotics in poultry feeding has led scientists to rethink for a viable alternative. In recent years, one of the most promising approaches has been the exploration of the power of the nature i.e. herbs, shrubs and trees. Herbal medicine involves the medicinal use of plants to treat disease and enhance general health and wellbeing. The properties of plants and their extract have been exploited as preservatives, flavours, digestive enhancers and remedies from ancient time in humans and animals. In recent years, few studies have been undertaken on supplementation of sea buckthorn leaf meal in broilers.¹⁻³

Sea buckthorn (*Hippophae rhamnoides*) (SBT) is a naturally growing shrub that is native to Eastern Europe and Asia and is found in the high altitudes of Indian Himalayan region. Its Latin name is derived from the words “hippo”, meaning horse, and “phaos”, which is gloss or flare⁴ translated as a shining horse⁵ or more freely as a glossy coat.⁶ SBT is widely used in medicine for the treatment of cardiovascular diseases, flu, mucosal injuries, skin disorders, hepatotoxicity and hypoglycaemia. SBT positively affects metabolic diseases⁷ with the ability to slow down ageing and protect against radiation-induced damage, accelerate the healing of burns and frostbites, and reduce feather loss. Anti-stress and adaptogenic activities have been confirmed.⁴ Few studies on SBT have portrayed its efficacy in eliciting the production performance in poultry.^{1,8}

The global poultry production has taken a quantum leap during the past few decades. The success of the poultry sector is widely credited for its scientific approach in terms of gene pool, flock-management, nutrition, product-processing, packaging, health care, high-tech poultry equipments etc. It is beyond doubt that an accelerating growth of poultry sector is needed to mitigate the protein hunger of burgeoning human population worldwide in the coming decades. However, growing biosecurity concerns and increased awareness among consumers pertaining to safe and healthy poultry products have resulted in a paradigm shift in the logistics of poultry productions. Efforts are being made to exploit various phytobiotics as a viable alternative to antibiotics. Use of sea buckthorn leaves in

poultry feed is a novel approach to elicit production and immunity in chicken. However, the mode of action of sea buck thorn leaf meal in poultry is not entirely clear.

Discussion

Properties

Leaves, stems, tubers, roots as well as blossom of sea buckthorn contained a high content of ascorbic acid (vitamin C) and also carotenoids, polyphenols, flavonoids, tocopherols, alkaloids, chlorophyll derivatives, amino acids and amines. The vitamin C content in Sea buckthorn ranged between 360 and 2500 mg/100 g.^{7,9} *Hippophae* leaves contained significant amounts of proteins (20.7%), amino acids (0.73% lysine, 0.13% methionine and cystine) minerals (Ca, Mg and K), folic acid, catechins, esterified sterols, triterpenols and isoprenols.^{8,10} Tannins hippophaenins A and B had been isolated from SBT leaf.¹¹

Body weight gain

Weight and egg rate of poultry were increased greatly after feeding poultry with leaves, seeds and fruit residues of SBT.⁸ It had been reported that the weight of chickens increased 5.74% and that of hens 7.81% after feeding with SBL and fruit residues for 56 days.¹²⁻¹³ In poultry, SBT positively affected the egg production and body weight of laying.¹⁴

Feed conversion ratio

Basal diet of broiler chicken supplemented with 0.25%, 0.5% and 1% SBT leaves, respectively resulted in beneficial growth performance in Arbor Acres broilers in 0.5% SBT leaves supplemented group and 1% SBT leaves improved absorption of the calcium and phosphorous and the deposition of calcium.¹

Immunocompetence traits

Addition of SBT leaf powder at 2% level in poultry feed was found to be safe for Japanese quail on the basis of growth response, biochemical and the gross and histopathological studies. Moreover, it had immune stimulatory potential resulting in proliferation of lymphoid tissues in various lymphoid organs.¹⁵

Heat stress

The effects of sea buckthorn leaves (SBL) on meat flavour in broilers during heat stress were studied.¹⁶ The results showed that the content of breast muscle IMP of 0.25%, 0.5%, and 1% SBL groups (group I, II, III) was significantly increased by 68%, 102% and 103% ($p < 0.01$), compared with the control respectively. The content of thigh muscle IMP of group II and III was significantly increased by 56% and 58% ($p < 0.01$) respectively. Additionally, ADSL mRNA expression in group I, II and III was increased significantly ($p < 0.01$) by 80%, 65% and 49% compared with the control, respectively. The content of IMP and expression of ADSL mRNA were increased by basal diet supplemented with SBL. Therefore, the decrease of meat flavour caused by heat stress was relieved.

Conclusion

Systematic approach is needed to explain the efficacy and mode of action for SBT leaf meal in different species of poultry. Use of molecular tools and nano technology to augment its use is warranted for sustainable poultry production.

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Conflict of interest

Author declares that there is no conflict of interest.

References

- Chen X, Zhao W, Liu HN, et al. Effect of Sea buckthorn leaves on growth performance and calcium metabolism in Arbor Acres broilers. *Dongbei Nongye Daxue Xuebao*. 2011;42:19–24.
- Kulkarni RC, Mandal AB, Munj CP, et al. Response of coloured broilers to dietary addition of geloi (*Tinospora cordifolia*) during extreme summer. *Indian J Poult Sci*. 2011;46(1):70–74.
- Singh A, Kaushik PK, Yadav PK, et al. Effect of Bael (*Aegle Marmelos*) and Giloy (*Tinospora Cordifolia*) alone and in combination on growth and feed conversion of broiler chicks. *Global J Res Analysis*. 2014;3:96–99.
- Michel T, Destandau E, Le Floch G, et al. Antimicrobial, antioxidant and phytochemical investigations of Sea buckthorn (*Hippophae rhamnoides L.*) leaf, stem, root and seed. *Food Chem*. 2012;(131):754–760.
- Li TSC, Beveridge THJ. *Sea buckthorn (Hippophae rhamnoides L.): Production and utilization*. Ottawa: NRC Canada; 2003. p. 101–106.
- Valíček P, Havelka EV. *Hippophae rhamnoides* (in Czech). *Start Benešov*; 2008.
- Bal LM, Meda V, Naik SN, et al. Sea buckthorn berries: a potential source of valuable nutrients for nutraceuticals and cosmeceuticals. *Food Res Int*. 2011;(44):1718–1727.
- Biswas A, Bharti VK, Acharya S. et al. Sea buckthorn: new feed opportunity for poultry in cold arid Ladakh region of India. *World's Poult Sci J*. 2010;66(04): 707–714.
- Christaki E. *Hippophae rhamnoides L.* (Sea buckthorn). A potential source of nutraceuticals. *Food Public Health*. 2012;2(3):69–72.
- Geetha S, Jayamurthy P, Pal K, et al. Hepatoprotective activity of sea buckthorn (*Hippophae rhamnoides L.*) against carbon tetrachloride induced liver injury in rats. *J Sci Food Agr*. 2008;88:1592–1597.
- Kumar R, Kumar GP, Chaurasia OP, et al. Phytochemical and pharmacological profile of Sea buckthorn oil: a review. *Res J Med Plant*. 2011;5:491–499.
- Hu JZ. *Eco-economic values & comprehensive development techniques of Sea buckthorn, Zhengzhou*. China: The Yellow River Water Conservancy Press; 2000.
- Hu JZ, Guo XF. Evaluation of nutrient value of Sea buckthorn in north China. *Forestry Studies in China*. 2006;8:50–52.
- Wang YC. Analysis on nutrition elements of Sea buckthorn. *Hippophae*. 1997;10:24–25.
- Patil V, Asrani RK, Patil RD. Safety evaluation of Sea buckthorn (*Hippophae rhamnoides*) leaves in Japanese quail. *Vet World*. 2013;6(9):596–600.
- Zhao W, Chen X, Yan C, et al. Effect of Sea buckthorn Leaves on Inosine Monophosphate and Adenylosuccinatelyase G Gene Expression in Broilers during Heat Stress. *Asian-Aust J Anim Sci*. 2012;1:92–97.