

Sea Buckthorn: A New Feed Opportunity for Livestock and Poultry

DN Singh*

College of Veterinary Science and Animal Husbandry, DUVASU, Mathura, India

***Corresponding Author:** DN Singh, College of Veterinary Science and Animal Husbandry, DUVASU, Mathura, India.

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Herbal non-conventional feed resources (NCFR) 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 [24]. Feed alone contributes to 60 to 70 percent of total cost of rearing of livestock and poultry. Protein is the most expensive nutrient, by introducing new protein source in breeder and their post hatch diet, we can certainly decrease the cost of production [1]. Therefore, the production economy can be improved mainly by minimizing the feed cost by herbal feed supplementation or utilization of NCFR. Now days, One such plant which can be exploited as NCFR in India and worldwide is "Sea buckthorn" (*Hippophae rhamnoides* L.).

Sea buckthorn (*Hippophae rhamnoides*) is a thorny, dioecious, wind pollinated, multipurpose temperate bush plant bearing yellow or orange berries with nitrogen fixing abilities [22]. It is commonly known as "cold desert gold", "Miracle plant" due to its various beneficial effects over plant, animal, human and soil health. Sea buckthorn is an important medicinal resource and is found in abundance in Indian subcontinent especially the North Western Himalayan regions [5]. In India fruit of sea buckthorn is also known as 'Leh berries' or 'miracle fruits' [4,25].

The plant inhabits dry temperate region and high altitude regions of Himachal Pradesh, Jammu and Kashmir and Uttarakhand. The native of this plant is European and Asian countries. In India, it is widely distributed at high altitude, cold arid condition of Ladakh and Lahul-Spiti, parts of chamba and upper Kinnaur districts of Himachal Pradesh, Sikkim and Arunachal Pradesh [23].

In ancient Greece, the leaves of Sea buckthorn when added to horse fodder were found to result in weight gain and shiny hair, thus the Latin name 'Hippophae' meaning shining horse [19]. Sea buckthorn is a small shrub comprising of fruit and leaves that are rich in nutrients and bioactive components such as vitamins [15], amino acids [18], lipids [12], sugars and acids, and flavonoids [13]. Sea buckthorn has antioxidant [9-11], anti infective function and exerts beneficial effects on liver fibrosis [8] and immune function [6]. The crude protein, lysine, methionine + cysteine, calcium, and phosphorous content of Sea buck thorn leaves and seeds are 20.7% and 26.4, 0.73% and 0.42, 0.13% and 0.59%, 1.18% and 0.31%, 0.18% and 0.34% respectively. However, the crude protein, methionine + cysteine, calcium and phosphorous content of Sea buckthorn fruit residues have been found to be lower than leaves and seeds (18.3%, 0.06%, 0.19%, 0.15%) where as the lysine content of Sea buckthorn fruit residues has been found to be higher (0.84%) than leaves or seeds [17]. Since, the leaves, seeds and fruit residues contain high crude protein, amino acid, calcium and phosphorus, they have advantages as basic materials for feed formulations for poultry. It has been observed that body weights of poultry have increased greatly after feeding leaves, seeds and fruit residues of sea buckthorn [30]. Sea buckthorn has a large content of vitamin C, several folds as compared to other fruits [4]. The levels and balance of amino acid in diets are all important nutritional variables that affect the economic efficiency of an egg laying enterprise.

Berries as well as other parts of sea buckthorn represent a rich source of biologically active compounds. Sea buckthorn and especially its berries provide a rich source of many minerals, includ-

ing, but not limited to Ca, P, Fe, and K. Sea buckthorn has a large content of vitamin C, several-fold compared to other fruits [4]. The vitamin C content in sea buckthorn ranges between 360 and 2500 mg/100 g. The plant is a valuable source of the vitamin B group, mainly B1 (thiamine) and B2 (riboflavin). Other vitamins rich in sea buckthorn include, for example, vitamin E, vitamins A and K [2,7]. The berries provide a good source of carotenoids, mainly β -caroten, lycopene, lutein, and zeaxanthin. The saccharide content is also high. The most common carbohydrates are glucose, fructose, and xylose. All parts of the plant contain many different proteins, mainly albumins and globulins [16]. Sea buckthorn is a source of organic acids, mainly malic acid, quinic acid, oxalic acid, citric acid, and tartaric acid. Sea buckthorn is a good source of flavonoids too, mainly quercetin, kaempferol, myricetin, and isorhamnetin, and an important source of tocopherols [7].

It is a small shrub comprising of fruit and leaves that are rich in nutrients and bioactive components such as vitamins, amino acids, lipids, sugars and acids and flavonoids [28]. The leaves, seed, fruit and fruit residues of sea buckthorn having high crude protein, amino acid, calcium and phosphorus content and could be used to feed livestock and poultry without the accumulation of toxins, and that the feed also had a stimulating effect on growth, immunity, production and reproduction performance in livestock and poultry [20]. It was also observed that feeding of SBT leads to improving the body weight in pigs, milk production in goat and egg laying performances in poultry birds. Sea buckthorn has antioxidant function and exerts beneficial effects on liver fibrosis and immune function. The cake and leaves of SBT can also be used as feed supplements to decrease production cost and improves the production efficiency in livestock and poultry [14,29].

Hence, it can be concluded that supplementation of various parts of sea buckthorn viz. fruit, seed, leaves and oil in the diet of livestock and poultry leads to improving the health, growth, production and reproductive performances as well as it is also helpful in improving the socio-economic status of the farmers.

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