



Seaweed Potential in Animal Feed

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I. INTRODUCTION:

Seaweed colonize aquatic habitat and mainly used by coastal population. Many seaweeds species normally used in unprocessed form, in medicine, human diets, animal feed and also as fertilizer to improve soil nutrient capacity. They are rich in Potassium, Calcium, Sodium, Magnesium and Phosphorous and also trace elements such as Iron, Manganese, Zinc, Cobalt and Iodine. Seaweed are simple organisms, which take advantage of sunlight to convert carbon dioxide into oxygen and sugar during photosynthetic process. *Undaria pinnatifida*, *Chondrus crispus* varieties are associated with many health benefits, such as decreasing blood pressure and also used as valuable protein source. The high mineral content is due to their ability to absorb inorganic substance from the environment. They are various edible seaweeds for human consumption with high protein content with various essential Amino acids.

They also absorb mineral from seawater and contains 10-20% more than land plants. In general red and green seaweeds have high proportion of nutritional content brown seaweeds. Algae have relatively high quality of protein compared to soy flour and wheat flour. More than 75% seaweed has high proportion of total essential amino acid than wheat flour and 50% than soy flour. Algae are generally richer than soy flour than in the proportion of methionine but poorer when compared to wheat flour. On the other hand algae are poorer in the proportion of lysine compared to soy and wheat flour. Among the marine organism, seaweed represent one of the richest source of natural antioxidant and antimicrobials. They are excellent source of vitamin such as A, B1, B12, C, D and E and minerals such as Ca, P, Na AND I. Thus we can contribute to find a natural product that does not only eliminate or prevent disease but also improve the nutrient quality of meat and egg.

SEAWEEDES:NUTRITIONAL PROFILE:

Seaweeds are divided into three groups, without any taxonomic value based on the colour they present.

GREEN SEAWEEDES:

The commonly known green algae are organisms which belongs to the chlorophyceae class including both microscopic and macroscopic species. They are most diverse group with more than 13,000 species. The color is due to the presence of chlorophyll a and b pigment using during photosynthesis. Their maximum height is 1m. green algae are common in areas where light is abundant such as shallow water and natural pools the main genus is *Ulva*, *Codium*, *Cladophora*. *Ulva* is found in brackish water and their biomass is rich in protein content and has a potential as an alternative source of proteins for animal feeding contains highly insoluble dietary fibres (glucans) having higher protein content than other seaweeds. *Ulvan* is a heteropolysaccharide of the cell wall that represents 9 to 36% of biomass. It consists of rhamnose, xylose, glucose, uranic acid which regulate immune function and act as anticoagulant, antiviral, anticancer and inflammatory activities. Some *Ulva* species is used as livestock feed and adding *Ulva* to diets in powder form can decrease abdominal and subcutaneous fat improving meat quality and amylase activity.

RED SEAWEEDES:

In General compared to green and brown seaweeds red algae contains a high amount of protein. The protein of this seaweed is made up of one or more chains of amino acid especially glycine, alanine, arginine, proline and aspartic acid. Essential amino acid reveal almost half of the total amino acid and their protein profile is close to egg protein profile. Most red algae contain cholesterol, desmosterol, sitosterol, fucosterol and chalinasterol. Red algae also contain soluble fibres such as sulphated galactans, xylans and floriden starch. Red algae (Rhodophyta) are seaweeds with an interesting nutritional profile. The minerals present in some red algae namely *Chondrus crispus* are Na, K, Ca, Mg as well as Fe, Zn the iodine content is high in *Gracilaria* sp. Reaching 426mg/100g of seaweed dry biomass but not more than brown



seaweed. Most red seaweed contain water soluble vitamins B and C mainly amine and riboflavin and liposoluble vitamins such as carotenoids .the carotenoids are represented by different pigment which form the resulting seaweed color together with chlorophyll and are also very strong antioxidant.The main carotenoids are alpha and beta carotene and their derivatives such as zeaxanthin and lutein.

BROWN SEAWEED:

In general brown algae (phaeophyceae)are seaweeds with the lowestprotein content when compared to red and green algae. The concentration of threonine, Valine, Isoleucine, Leucine, Phenylalanine, Lysine and methionine were higher in undaria pinnatifida than in laminaria sp.However laminaria sp had higher concentration of cysteine than undaria pinnatifida.brown algae contained higher concentration of phosphoserine than red algae. The soluble fibres are alginates ,fucans,and laminarins for brown seaweeds fucoidans ,sulphated polysaccharide are extensively involved in the cell wall of brown seaweed.Fucoidan present several physiological and biological characteristics such as antitumor,anticoagulants, antioxidant,antiviral and antithrombotic activities besides the impact on the inflammatory and immunological systems.according to some researchers Laminarin is the second main source of glucan in brown algae and it was detected as aregulator of intestinal metabolism through its impact on mucus structure, intestinal ph and short chain fatty acid formation. Brown algae can participate in the accumulation of metals due to their carboxyl group and because the cell wall is formed by cellulose.Some of the most important vitamins present in most brown algae are vitamin C,E and B ESPECIALLY thiamine and riboflavin. Brown seaweeds contain larger amount of vitamin E and vitamin C.FUCOXANTHIN is the main carotenoid in brown seaweed and has been shown to have many health benefits

SEAWEED AS VALUABLE NUTRITIONAL AND NUTRACEUTICAL ANIMAL FEED

The term nutraceutical refers to the combination of nutritional and pharmaceutical property containing food component.

FISH FARMING:

Algae are natural alternative source to soybean for fish diet presenting economic and nutritional advantage since the nutritional profiles made to soybean show that this plant does not fully match the fish nutritional requirements. Application

of green Ulva and red seaweeds Gracilaria plays major role in fish diets. It was discovered that using seaweed meals as supplement in fish diets enhance the growth, lipid metabolism, stress response, disease resistance financial gain and even ecological preservation. In conclusion there is a great quantity of data to support the use of seaweed in order to achieve a higher productivity on fish farms.The advantage range from growth and development rates, disease resistance, financial gain, and even ecological preservation this is a case where implementation of such research and development was a relatively easy process, leading to various companies developing their own product ,as exemplified with AquaArom proving that the safety of using seaweed as fish feed.

BROILER POULTRY:

High corn price led to the search for new feed capable to provide the required nutrients for broilers in order to maintain productivity and lower the feed price.Green algae (chlorophyta) is an alternative poultry feed.Animal feed with two different concentrations of Ulva rigida (10 and 20./.).The data obtained indicates that the feed intake and body weight was better with 10./. of Ulva.Later it was found that poultry fed with 10./. mixture of green algae containing various species of genus Ulva caulerpa,Codium,Halimeda showed better growth in body weight,a lower level of fats and higher protein content. As practical conclusion it appears to be possible to enrich broiler feed with green seaweed,or a mixture of green and red seaweeds stimulate growth and health of the broiler.

LAYING POULTRY:

Eggs are one of nature whole some food because of their content in essential and non-essential minerals high quality proteins,lipids and vitamins. Egg composition can be altered by hereditary genes diet and poultry egg. Egg yolk contains natural carotenoids and its yellow color is attributed to beta carotene,zeaxanthin,kryptoxanthin,and lutein which are easily found in commercial feed. Poultry feed with seaweeds,enhance the level of vitamins,minerals and fatty acids mainly omega-3 fatty acid.Green algae Ulva with the inclusion of 13./.improved egg production and quality,increase the weight,shell thickness,yolk colour and reduce yolk cholesterol.Using brown seaweeds like Sargassum 3 to 6./. improve egg quality,reduce yolk cholesterol,also include high density lipoprotein which is beneficial to human health. in conclusion the use of various seaweed species has the potential



to enhance various qualities on poultry eggs. Such as quality, weight, yolk cholesterol reduction, other bioactive molecules capable even in reducing toxic bacterium levels in the digestive system of poultries.

II. CONCLUSION:

Seaweeds are rich in proteins, dietary fibres and phytochemical used to enhance nutritional quality of animal feed the increasing demand over renewable and sustainable energy sources without compromising on food and land resources can be fulfilled by seaweeds. There is a general lack of nutritional and biochemical studies of seaweed as feeds that make the analysis of seaweed composition effect in the animal welfare is difficult. Thus more studies regarding seaweeds complete biochemical profile are needed to fully understand the impact of seaweeds in the animals. However, the wild seaweed biomass does not have a quality guarantee because of variations in nutritional values and risk of bioaccumulation of heavy metals, to provide a reliable source of safe animal feed supplementation. Consequently, seaweed aquaculture is the alternative solution for seaweed production and can be met through improvements in existing technology already use in Acadian seaplants, seaweed production company in Canada.