

SEAWEED SUPPLEMENT DIET FOR ENHANCING IMMUNE RESPONSE IN MAMMALS AND POULTRY

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation-in-part of U.S. patent application Ser. No. 09/032,104, filed Feb. 27, 1998, now pending.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to seaweed and treated seaweed feed supplements for mammal and poultry wherein the host exhibits enhanced immune response. In another aspect, the invention relates to the introduction of seaweed supplement directly to mammal and poultry feed as well as introduction of grazing animals to plants and grasses, which have been pre-treated with seaweed extract. In still another aspect, the invention relates to seaweed feed supplement, which enhances the host immune system for periods beyond cessation of seaweed supplement introduction to the host diet. Aspects of the invention also relate to imparting resistance to Porcine Reproductive and Respiratory Syndrome (PRRS) disease in pigs that have been exposed to PRRS disease and to mitigating the stress of weaning in lactating mares.

2. Description of Related Art

Seaweeds have been used through antiquity in crop production and as early as the 1950's, evidence of plant growth hormones in seaweed was reported. Seaweed is now recognized as a source of plant growth regulators and has been demonstrated to have activity that includes cytokinin, auxin, gibberellin, and indole acetic acid. Seaweed has also long served as feed for domestic and wild animals. Some even graze on seaweed growing on rocky beaches and floating in the ocean water. Seaweeds have been dried and sold as a meal product to be mixed with other feed stuffs. The value of seaweed has been generally attributed to the fact that it is low in carbohydrate and proteins and rich in trace elements; including vitamins B,D,E and vitamin precursors including beta-carotene; and various growth hormones.

Bacterial, fungal, viral and other disease causing agents infect mammals including man, other mammals, plants, insects and poultry. The prevention and control of, for example, diseases have important health and economic implications. Diseases contribute to infections in humans and other mammals including common colds, herpes and cancer and the importance of their control is obvious. Also important is control of agent diseases in mammals and poultry for economic reasons as well as the ability of such mammals and poultry to become disease reservoirs or carriers, which facilitate the spreading of diseases to other host including humans. Plant diseases have been known to have a disruptive effect on the cultivation of fruit trees, tobacco and various vegetables as well as the utilization of plant leaves and grasses by grazing animals.

The prevention and control of diseases is thus of prime importance to man, other mammals and poultry; considerable research has been devoted to anti-disease measures. Prior research efforts have described water soluble extracts from marine red algae selected from the group consisting of *Turnerella mertensiana*, *Schizymenia epiphytic*, *Turnerella pennyi* and mixtures thereof as effective to inhibit the growth of herpes simplex virus, Type 1 and Type 2 and herpes zoster and to relieve the pain caused by infection attributable to such viruses.

Applications of materials containing high concentration of hormones reduced plant stress and enhance plant tolerance to drought and salinity. Seaweed, an excellent source of cytokinins and auxins has been associated with enhanced root development of grasses grown under stress environments. Concentration of antioxidants increase significantly in response to exogenous seaweed treatments. Increase of these antioxidants had been correlated with photosynthetic capacity of plants subject to environmental stress.

So far as animals are concerned, seaweed supplements have been described as providing increased nutritional value.

When animals, mammals and poultry are grown for food production, there is generally a loss of a small but constant percentage of the animals prior to bringing the animals to the market which may be due to lack of nutrients, sickness, improper growing temperature and the like. This means that the feed eaten prior to death of the animals and other costs expended on the animals, which do not survive, are wasted. In addition, animals consuming costly feed for fattening which have lowered immune systems also waste the cost of the feed and decreases the weight gains of poultry and mammals and thus their economic value.

SUMMARY OF THE INVENTION

It has now been found that seaweed supplement, both meal and water-soluble extract forms of seaweed, enhance immune responses in mammals and poultry when introduced into the host diet either directly, or indirectly through plants including forages.

The invention is directed to use of seaweed supplement, for example, from *Ascophyllum nodosum*, to improve immune response in mammals and poultry. When the seaweed supplement is included as a pasture treatment or feed ingredient for ruminant and non-ruminant animals, poultry, and other mammals, the immune function is enhanced and health of the host is improved. Studies show sheep that grazed treated forage had increased blood levels of vitamin A and selenium indicating that the anti-oxidant activity had been increased in the host as well as plants that the mammals grazed. In addition, influence of the seaweed supplement on steers that grazed forage infected with the fungus, known to result in several animal disorders, provided further evidence that the steers that grazed the treated forage responded with increased anti-oxidant activity and that the steers had improvement in their immune function. Steers that grazed the fungus infected forage had depressed immune function that treatment with seaweed extract was able to reverse and to restore to normal levels. Further the improved immune function achieved by the cattle grazing on the aforementioned pasture was retained through feedlot finishing even without continuation of the seaweed supplement being furnished to the diet. The invention was also productive in providing grazing lambs improved antioxidant function, daily gains and total gains as compared to control lambs grazing non-treated pastures.

An independently inventive embodiment is directed to imparting resistance to PRRS disease in pigs that have been exposed to PRRS disease and comprises administering a PRRS disease resistance imparting effective amount of seaweed supplement to the pigs. Weaned pigs stressed by exposure to PRRS disease present within the swineherd were fed different amounts of seaweed extract or seaweed meal. The seaweed extract and meal were effective in improving the health of the pigs resulting in increased feed intake, growth rates (higher daily and total gains) and