Seaweed an unexploited nutritional source with potential in human food and animal feed industry

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Seaweed has a great potential within human food and animal feed industry. Seaweed in food is the most important utilization area of macro algae today. It can be used as direct consumption, functional foods and as additives such as carrageen, alginates and agar. Dulse is a red seaweed which has a high protein content and contains high amount of fibers. This study has found that utilization of an enzyme called xylanase has been successful when separating and extracting proteins in dulse. This method has a great potential when using dulse as a protein source in for instance the human food and animal feed industry.

Since the global food and feed demands are increasing with the increasing population and living standard, there is a requisite to find new sustainable and climate friendly approaches to satisfy this increasing demand of food and feed. Cultivation and harvesting of seaweed has a great potential within this field.

Dulse is a red seaweed widely spread in the northern part of the oceans with relatively high protein content, approximately 8-35 % proteins of the dry weight. It also contains high amount of fibers. The fibers in dulse mainly consists of the polysaccharide xylan. Previous studies suggest that the xylan acts as a barrier and decrease the digestibility of proteins in the intestine. Separation and enhancement of these two components are thus favorable in order to take advantage of these nutrients.

Figure: Dulse is a common red seaweed in the northern oceans.

Enzymes which hydrolyses proteins (proteases) and enzymes that hydrolyses xylan (xylanases) were used together with the prepared dulse samples in order to obtain separation. Different analyze methods were used to evaluate the protein and polysaccharide content in the samples.

Hydrolysis with proteases showed limited success, only a small increase in protein content was found. Hydrolysis with xylanase showed greater success with an increased protein concentration up to 53.4%. Hydrolyse with xylanase showed best potential when separating polysaccharides from proteins and extracting proteins in dulse. Further optimization of this method could generate valuable knowledge which can be utilized within human food and animal feed industries.

The raw material, dulse was milled, treated with enzymes, sieved/filtrated and freeze dried before analyzing of the protein and polysaccharide content. The xylanase enzyme was expressed and purified before it was used together with the dulse. The analyze methods used were investigating the protein and polysaccharide content in the prepared samples.

Utilization of xylanases in order to separate the proteins from the most abundant polysaccharide, xylan, in dulse seem to be a successful method. Both according to analyses performed in this study and in previous studies. Further research is required in order to confirm these findings and next step will be to optimize the amount of xylanase used.

The findings in this research are a good start for future research which may lead to optimized utilization of dulse which has a great potential within the feed and human food industries.

For further information and details regarding this research, the reader is referred to the full report: “Separation and Extraction of Proteins and Polysaccharides from the Seaweed Palmaria Palmata using Enzyme Digestion”