



Seaweed as a new, sustainable feed source for animal feed

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Background

To feed the growing world population living a life of increasing welfare, novel sources of feed for the production of protein in the form of meat, milk and eggs need to be found. These should not compete for resources currently in use, and have to complement or partly replace less sustainable sources like soy.

Objective

This project is looking into the potential of seaweed as source of macro nutrients and protein for animal feed. The project focusses on macro algae species commonly found in marine waters around the North West coast of Europe.

Project overview

First, whole seaweed will be studied as source of macro nutrients in diets of ruminants and monogastrics like pigs and poultry. Second, processed seaweeds will be studied as source of macronutrients, specifically for poultry diets. Hereafter, this project will focus on seaweed as source of protein for animal diets, and on possible bioactive properties of seaweed, using the chicken as experimental species.



Research question 1: Can whole seaweed be used as source of macro nutrients in diets of ruminants and monogastrics?

Colour	Species	Harvesting location
Brown Algae	<i>Laminaria digitata</i>	Scotland, Ireland
	<i>Saccharina latissima</i>	Scotland, France
	<i>Ascophyllum nodosum</i>	Scotland, Ireland
Red Algae	<i>Palmaria palmata</i>	Scotland, France
	<i>Chondrus crispus</i>	Scotland, Ireland
Green Algae	<i>Ulva lactuca</i>	Scotland, Ireland, France

Analyses:

- Chemical analysis
- *In vitro* digestibility Boisen and Fernandez, 1997
- *In vitro* fermentation – gas production test Cone, 1996

Research question 2: Can processed seaweed be used as source of macro nutrients in the diet of poultry?

The seaweed *Saccharina latissima* is ensiled, to start the breakdown of the cell wall material, for better access to nutrients by monogastrics

Analyses:

- Chemical analysis
- *In vitro* digestibility Boisen and Fernandez, 1997
- *In vivo* digestibility – digestibility experiment with broiler chickens

Research question 3: Can seaweed be used as source of protein in the diet of poultry?

Three seaweed protein extracts, from species selected based on results of previous experiments

Standardized broiler digestibility study

Basal diet diluted with 10% seaweed extract

Analyses:

- Chemical analysis
- Ileal digestibility
- Total tract digestibility
- Performance
- Feed and water intake

Research question 4: Bioactivity from seaweed fed to broiler chicken

During the same experiment, additional samples will be taken. These will only be analysed in the case of notable differences in performance.

Analyses:

- Morphology (of ileal tissue)
- Gene expression (in ileal tissue)
- Cytokine and chemokine analysis (in blood)
- Microbial composition (of caecal contents)

Incentive

With this research we hope to contribute to a sustainable animal feed production to feed the growing world population of increasing welfare.

References

- Boisen, S., and J. A. Fernandez. 1997. Prediction of the total tract digestibility of energy in feedstuffs and pig diets by *in vitro* analyses. *Animal Feed Science and Technology* 68:277-286. doi 10.1016/s0377-8401(97)00058-8
- Cone, J. W., A. H. vanGelder, G. J. W. Visscher, and L. Oudshoorn. 1996. Influence of rumen fluid and substrate concentration on fermentation kinetics measured with a fully automated time related gas production apparatus. *Animal Feed Science and Technology* 61:113-128. doi 10.1016/0377-8401(96)00950-9