**EFB and Seaweed for use in animal feeding**

**Lacking the best feeding approach to**

In this project, agro by product, EFB and seaweed will incorporated in the feed.

However, in the first half of the 20th century, the general consensus, based on nutrition science, had become that seaweeds were of too poor nutritive value to be recommended for livestock ([Evans and Critchley, 2014](http://www.sciencedirect.com/science/article/pii/S0377840115300274#bib0230)).

Intensive R&D is required to improve its value for feeding if EFB is to be utilized as a major ingredient in livestock rations.

proteomic changes occurring in MFGs

**Objectives**

1. To evaluate chemical and nutritional characteristics of empty fruit bunch (EFB) and seaweed supplementation in animal feed through an *in-vitro* rumen fermentation study.
2. To determine empty fruit bunch (EFB) and seaweed supplementation in animal feed on the production and quality of the milk, on intake and efficiency of nutrient use for milk production by goat.
3. Nutrient induced milk proteome in lactating does.

**Element should be included**

Phase I : to characterise chemical and nutrient characteristics of the proposed feed - this involves physico-chemical assessment of the nutrient properties and gas emission assays - better still if it can cut down methane emission

Phase II : Growth performance and production trial - using dairy goat as a model. - how this feed affect animal physiology that are responsible for growth and milk production ---> elements of your PhD can be inserted here. Throw in some growth and milk proteomics  for good measure as we cannot afford these in our original TRGS grant, so this HICoE grant will be ideal here.

Phase III : Storage and stability characteristics - how feasible is it to formulate, store, transport - this segment is currently not part of your PhD. But I'm thinking about materials analysis type of approach - e.g. TEM, antioxidants, caking properties, fungal and microbial contamination propensities etc....

The protein fractions of bovine and goat milk are qualitatively very similar, and the major difference among these milks is related to the proportions and classes of caseins [[4]](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0093361#pone.0093361-Vargas1). The hypoallergenicity of goat milk compared to bovine milk relates to the absence or low levels of αs1-casein (αs1-cn) in goat milk, and this fraction has been regarded as having allergenic potential, as determined by specific haplotypes [[5]](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0093361#pone.0093361-Olalla1). Studies based on molecular techniques have suggested that goat alleles present in different breeds result in significant differences in milk casein fraction, and these alleles can exhibit regional trends for these characteristics [[6]](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0093361#pone.0093361-Marletta1), [[7]](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0093361#pone.0093361-Prinzenberg1).

Goat milk proteins are more digestible than those found in bovine milk [[8]](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0093361#pone.0093361-Ceballos1), and the protein fraction of goat milk has higher levels of six out from the ten essential amino acids present, when compared to bovine milk [[3]](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0093361#pone.0093361-Haenlein1). In addition, the unique composition of goat milk, combined with its nutritional value, is related to the release of protein fragments during digestion or technological processing, which are able to perform specific biological activities [[9]](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0093361#pone.0093361-Park1). Studies involving milks from various animal species, including goats, indicate that milk and whey proteins, as well as the peptides generated from these proteins, have important biological activities, such as antimicrobial, immunomodulatory, antioxidant, antithrombotic, hypocholesterolemic and antihypertensive activities [[10]](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0093361#pone.0093361-Eriksen1), [[11]](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0093361#pone.0093361-Roncada1), [[12]](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0093361#pone.0093361-Murata1).