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In vivo digestibility of seaweed as a protein source for ruminant nutrition

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Why seaweed?

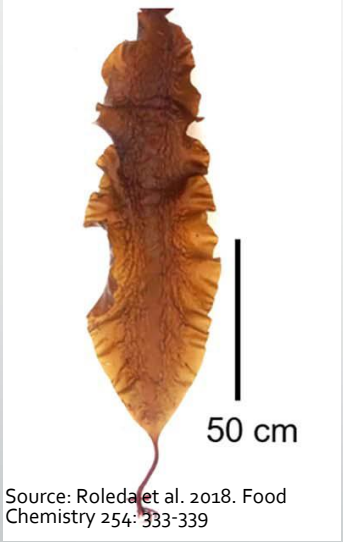
- Increase of import soya in Norway by 35% in 2050 (Özkan Gülzari et al. 2017; *Ag Sys*)
- Alternative protein feed requirement
- Macroalgae (aka. Seaweed) application area
- Abundant in the nature!
- PROMAC identified seaweed species with high protein content
- In vitro gas assay: High concentration of metabolisable protein

WHY NOT?*

***With the lessons learnt**

Macroalgae species

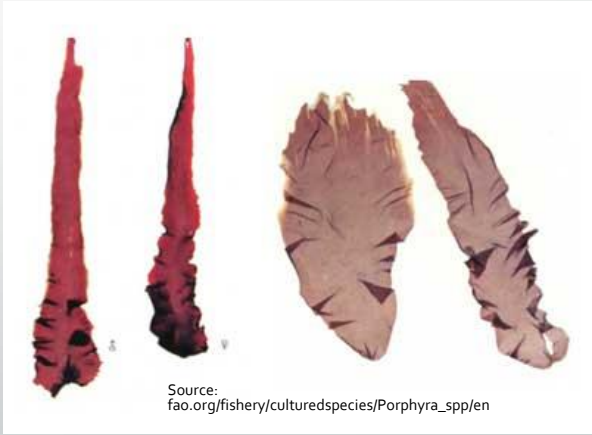
- Brown (*Saccharina latissima*): low-medium protein, high iodine, large size, easy to cultivate.



Source: Roleda et al. 2018. Food Chemistry 254: 333-339

Extracted

- Red (*Porphyra spp.*): rich in protein, small size, nori

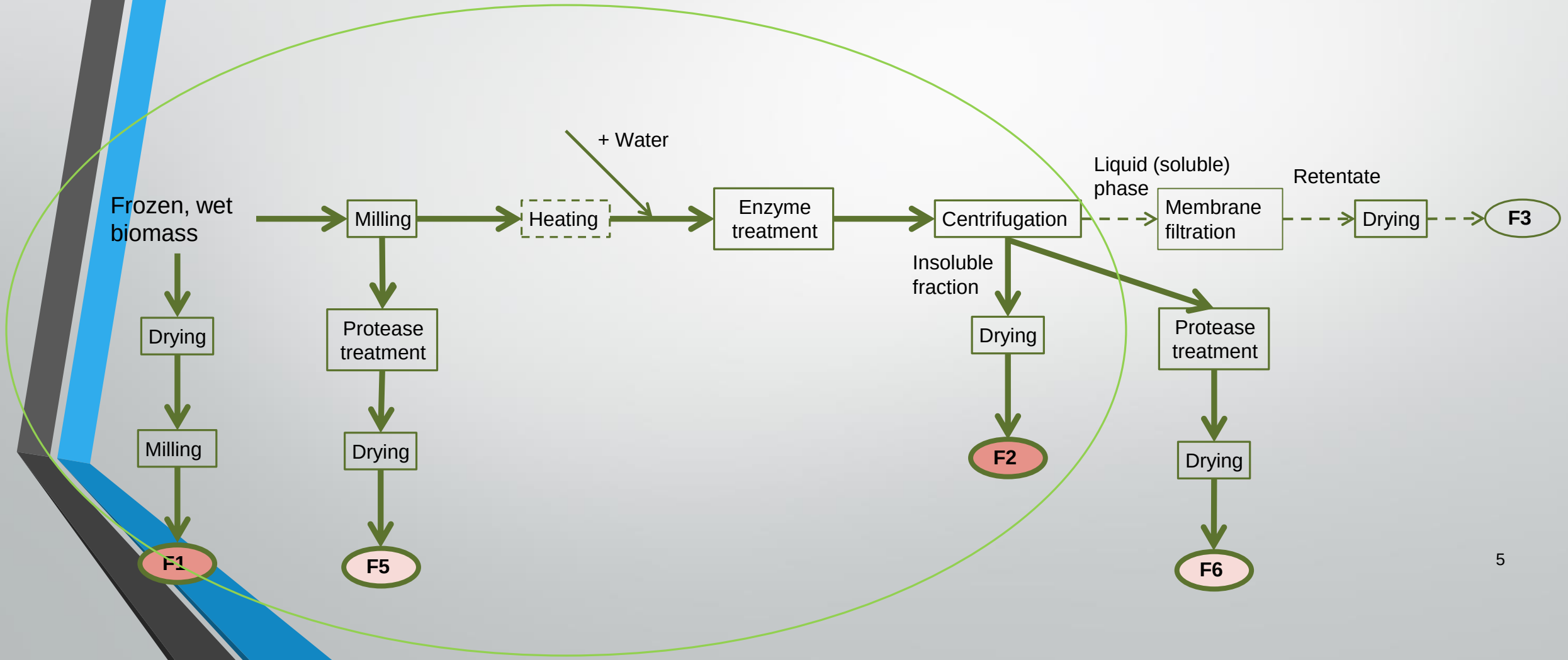


Source: fao.org/fishery/culturedspecies/Porphyra_spp/en

Purchased

- Both grow along the whole coast of North Atlantic

Production of protein-enriched fractions for animal feeding



Hypothesis

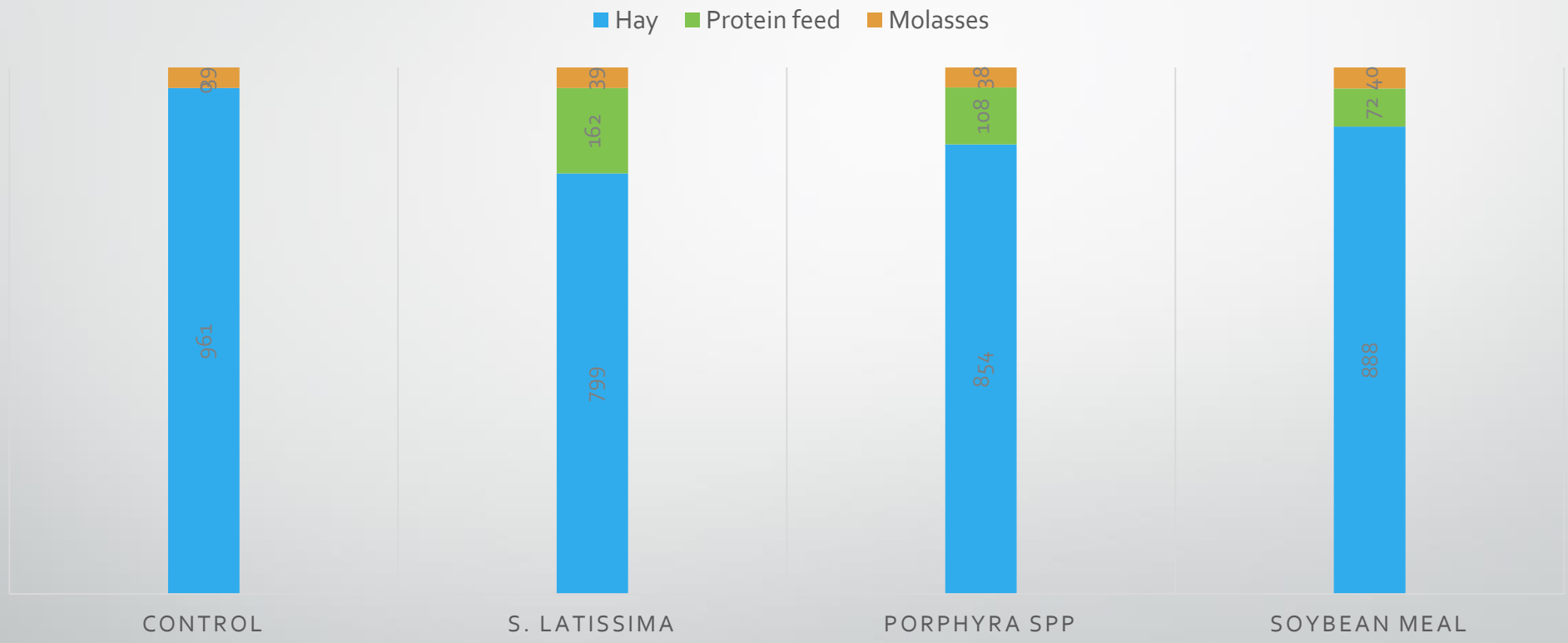
- (Nitrogen) Digestibility of *S. latissima* is comparable to / higher than that of Soybean meal (and *Porphyra spp*)

Reflection: *S. latissima* is edible and will be taken up by all animals (*)

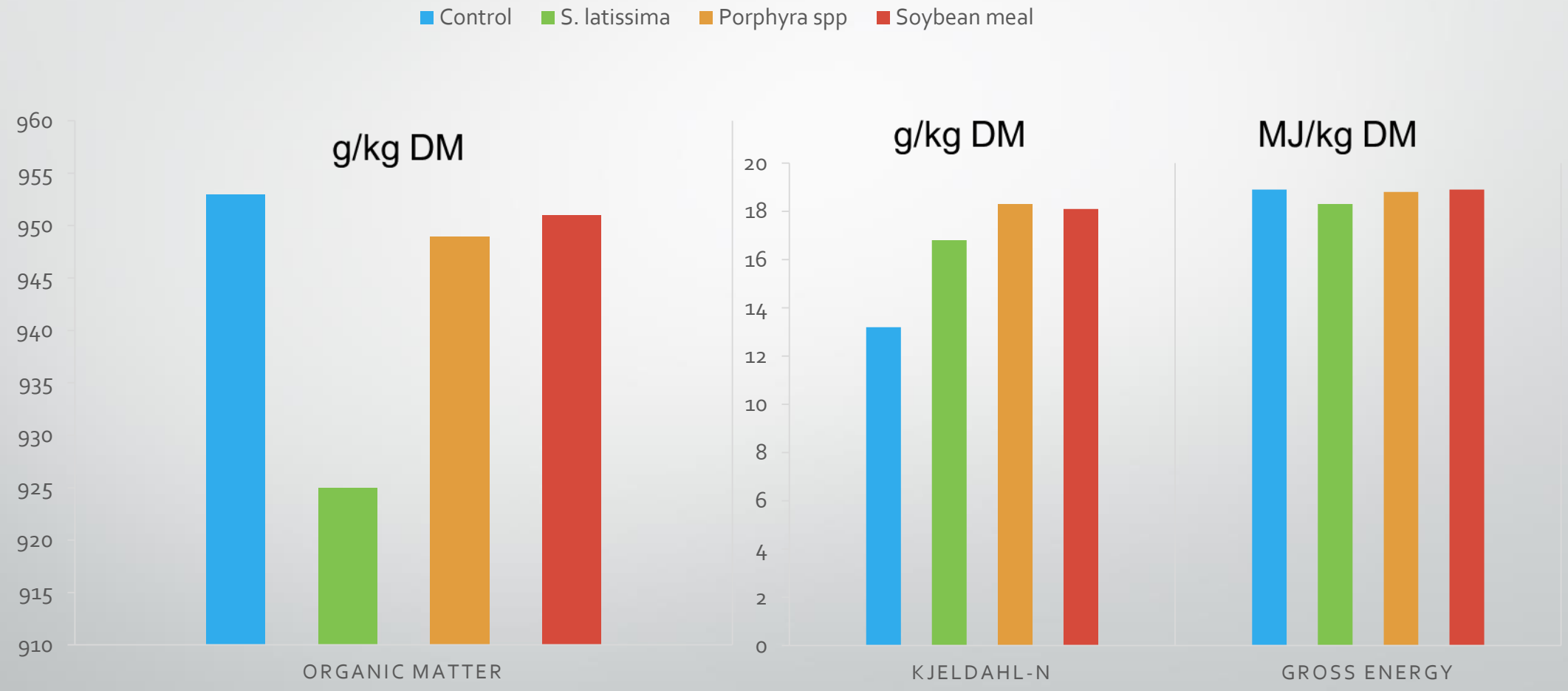
Experimental design and feeding

- In vivo trial 4 x 4 Latin square design
- Four diets: Control, *S. latissima*, *Porphyra*, Soybean meal
- 8 days adaptation 7 days collection
- Diets meet maintenance energy and protein requirements
- Diets isocaloric and isonitrogenous
- Restricted feeding twice a day

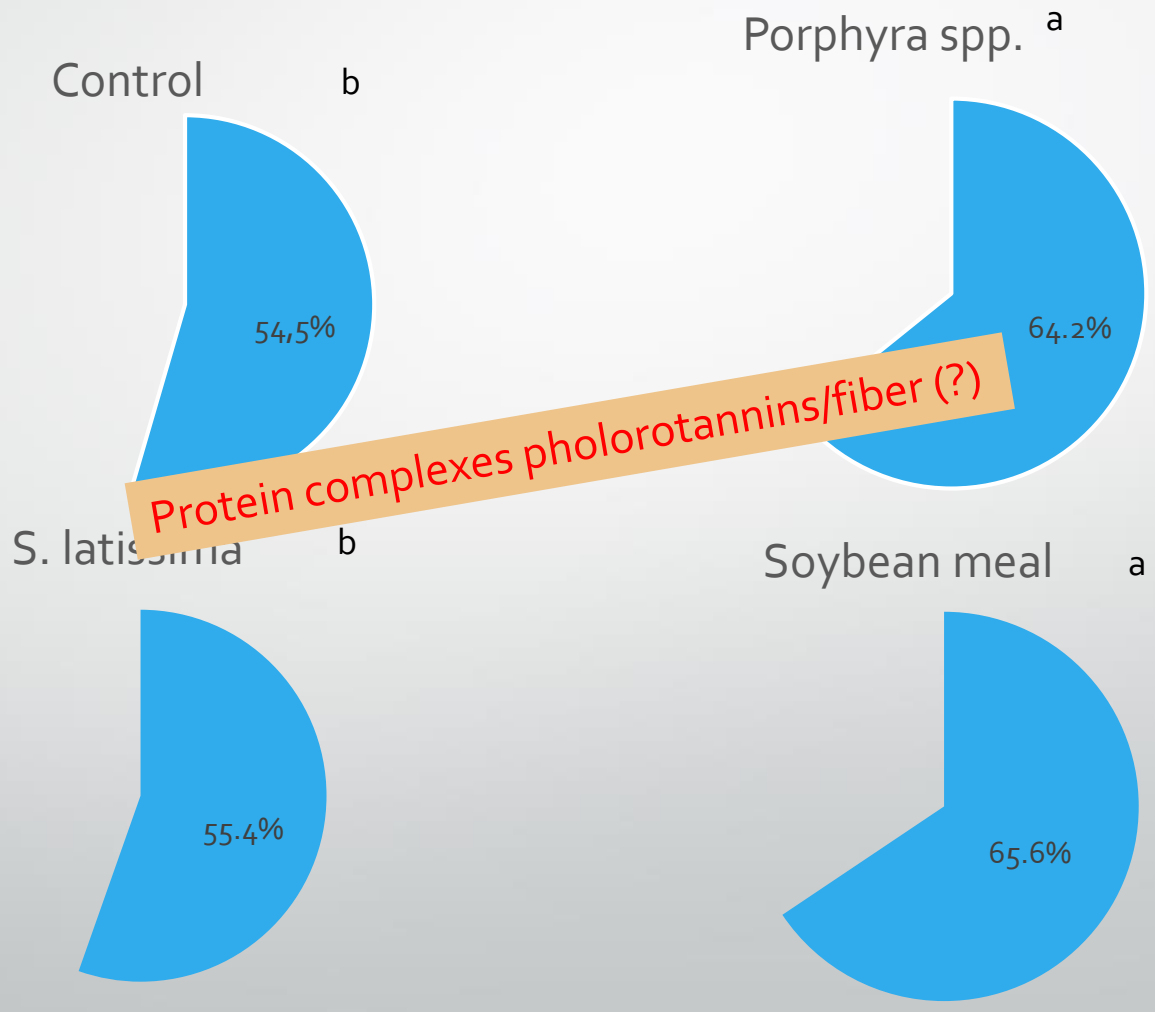
FEED COMPOSITION IN EXPERIMENTAL RATIONS (G/KG DM)



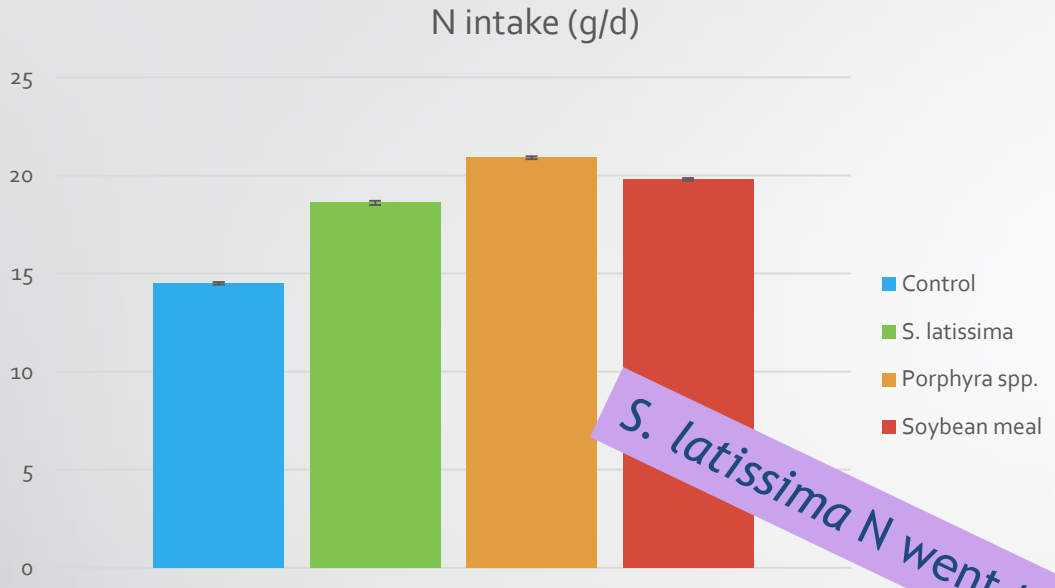
CHEMICAL COMPOSITION OF FOUR EXPERIMENTAL RATIONS

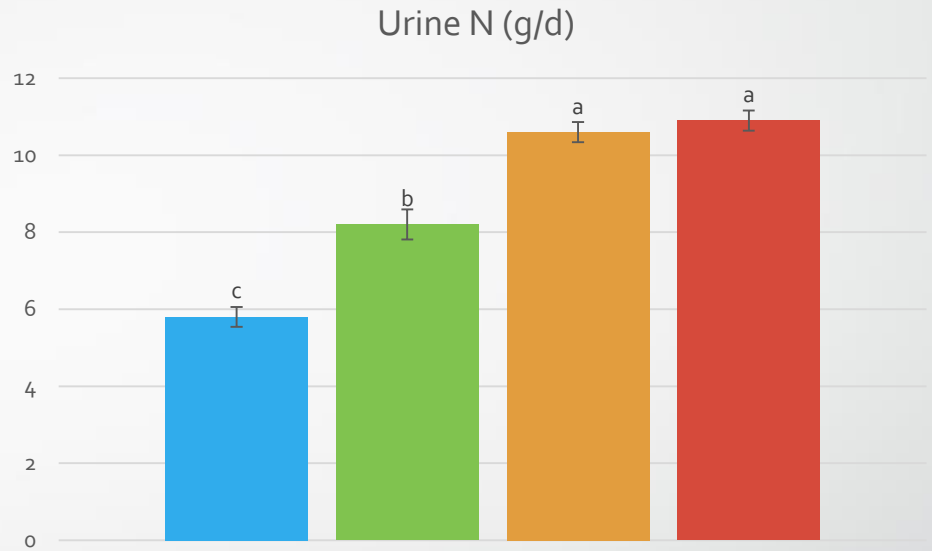


Nitrogen digestibility

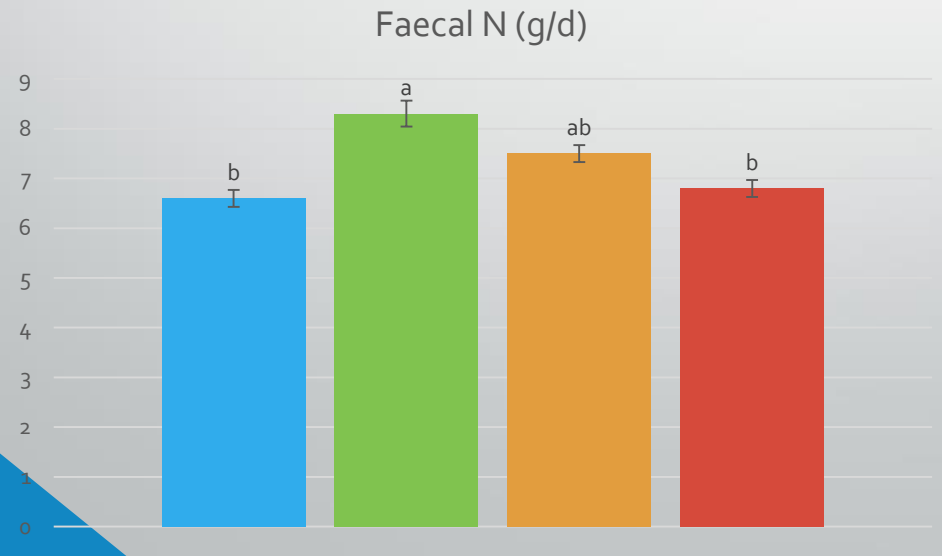


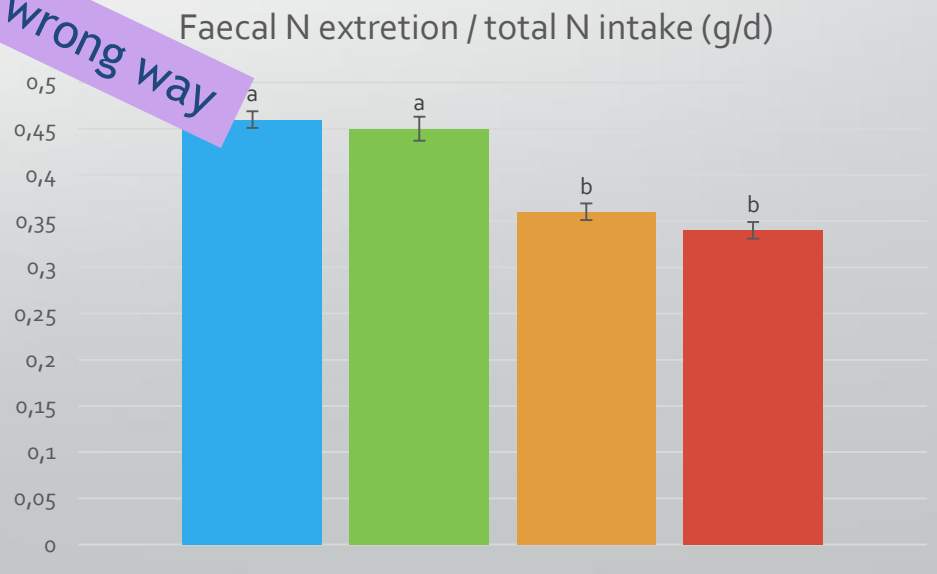
Nitrogen balance



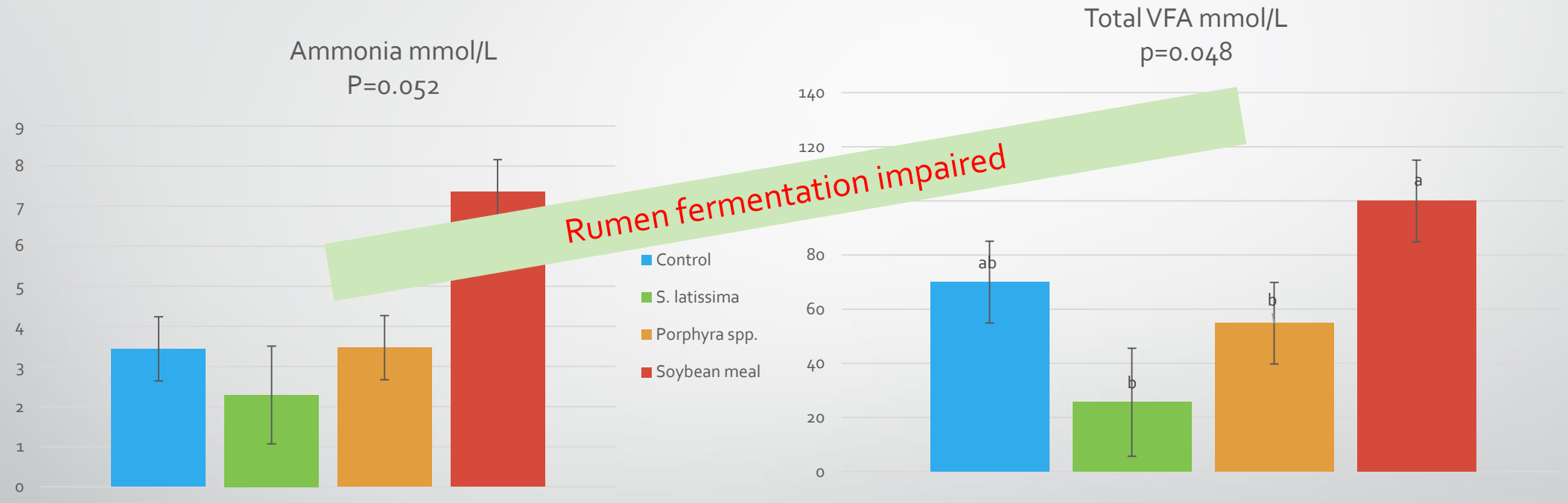


S. latissima N went the wrong way



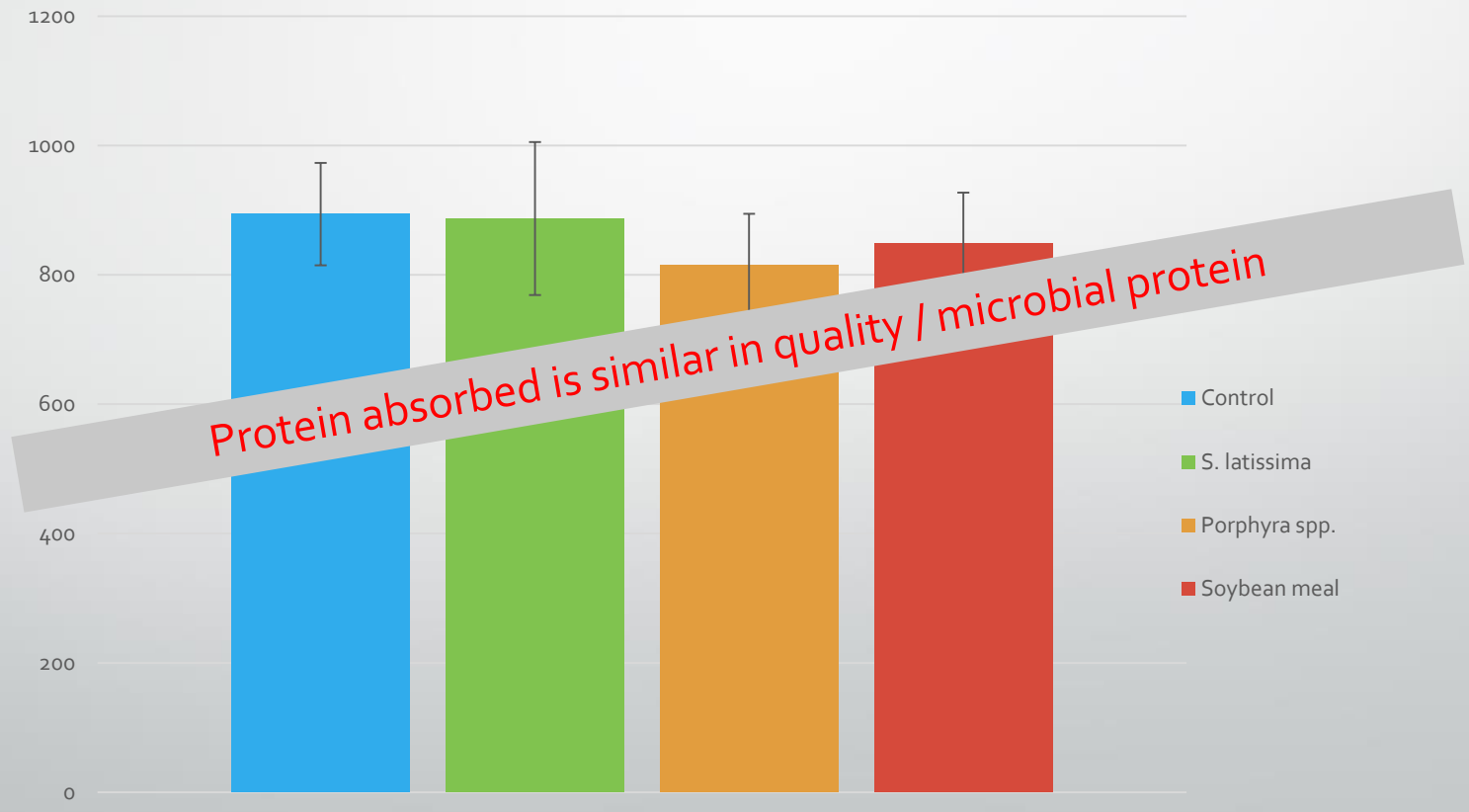


Rumen fermentation products



Higher ash (?) & iodine content!!!

Plasma AA composition (μM/L)



Conclusions

- Processing of plant material
- Adaptation period to the diet

Washing dissipated protein to water – loss of soluble protein*

14-day adaptation or longer?*

Not every seaweed species is the same.
Story with S. latissima is not over but…