



Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

– kunskap för en hållbar utveckling



Calle Niemi
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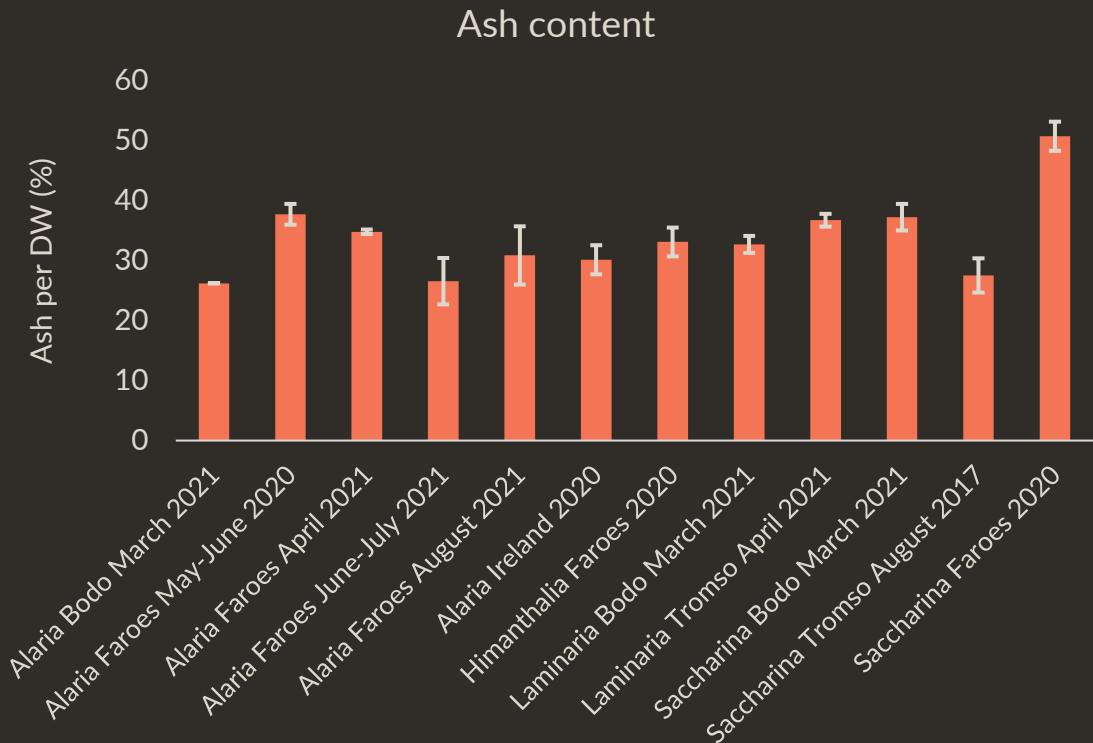
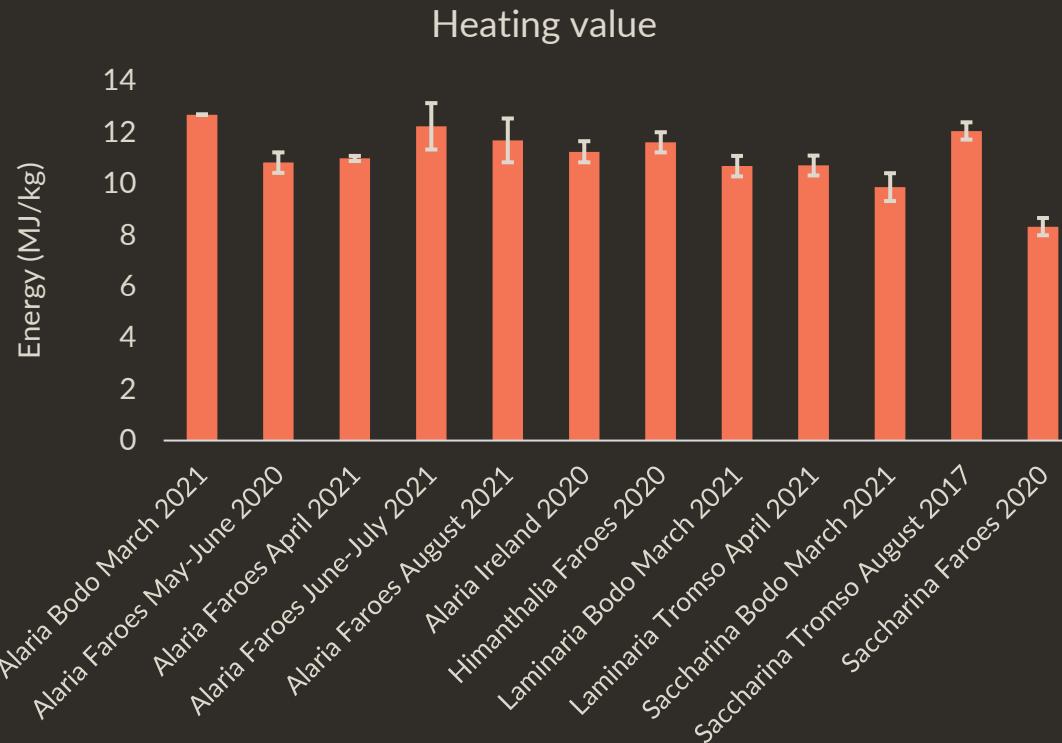


SLU's Role

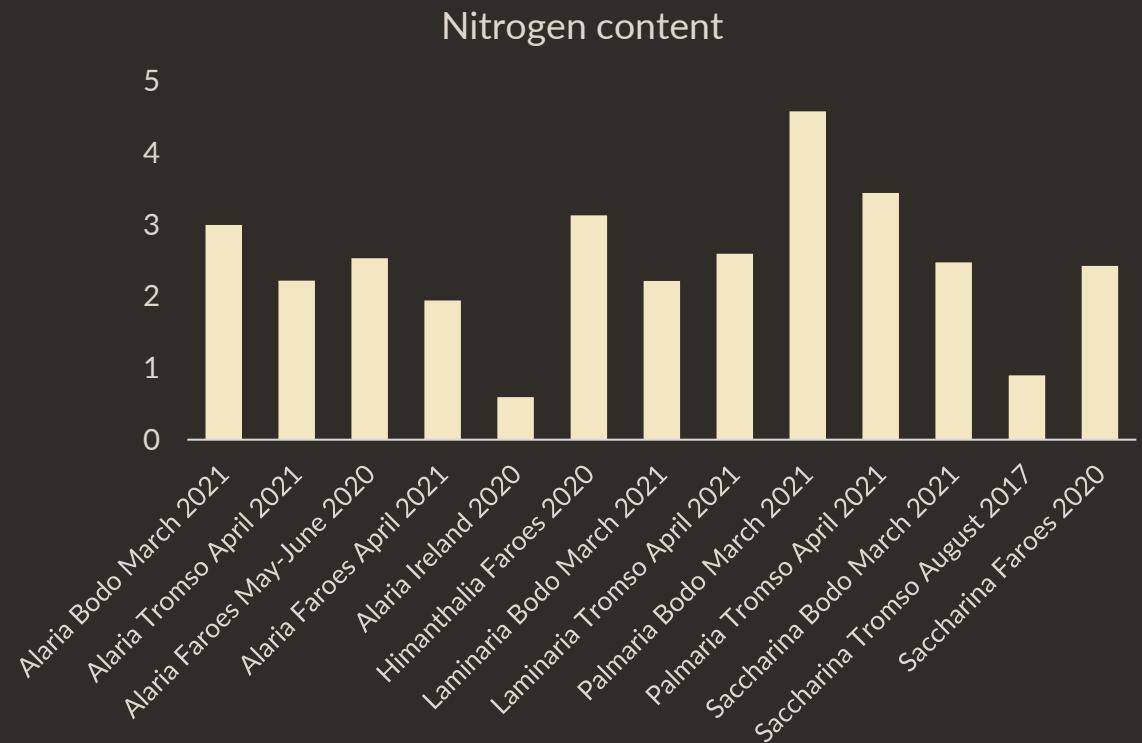
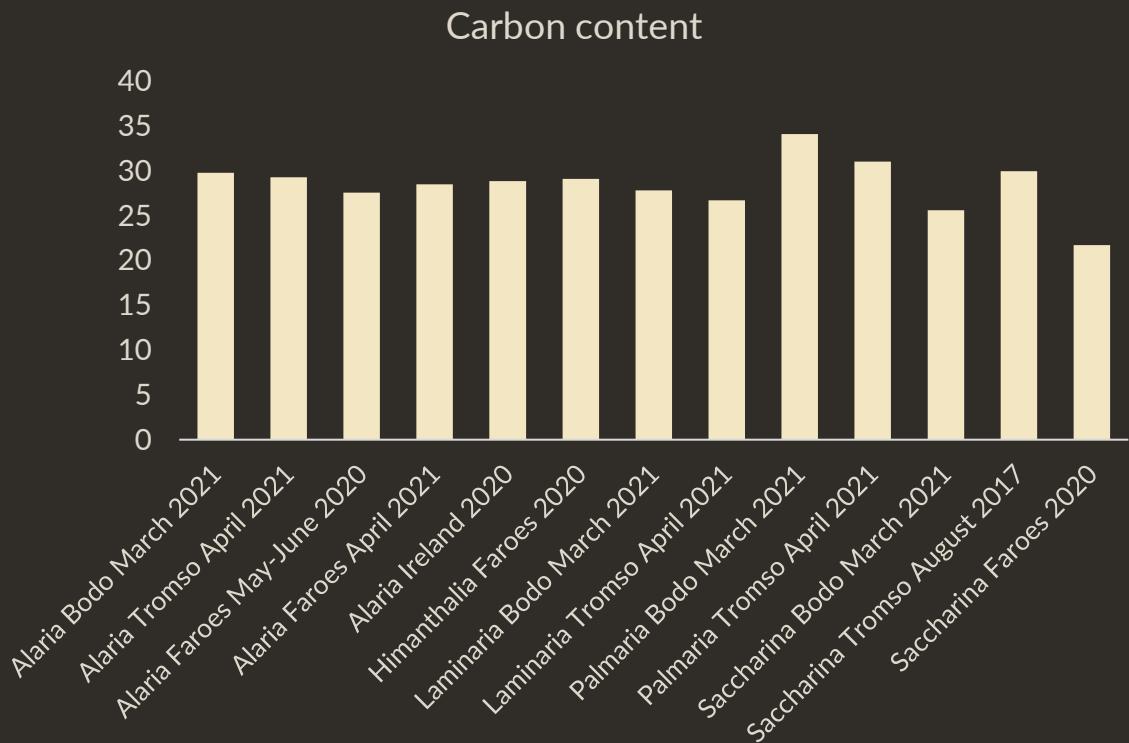
- ➡ Chemical characterisation of macroalgal biomass
- ➡ Development of spectroscopic characterisation of seaweed



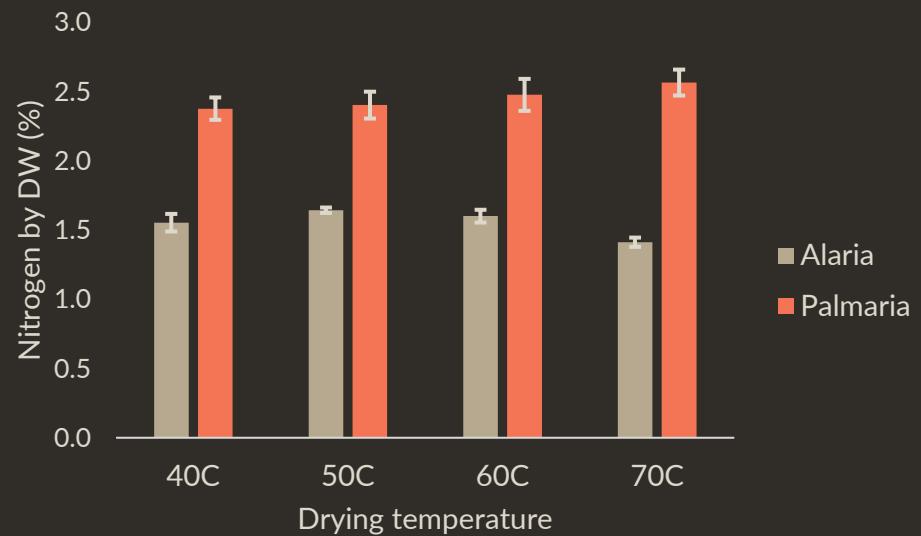
Energy, ash, C and N



Energy, ash, C and N



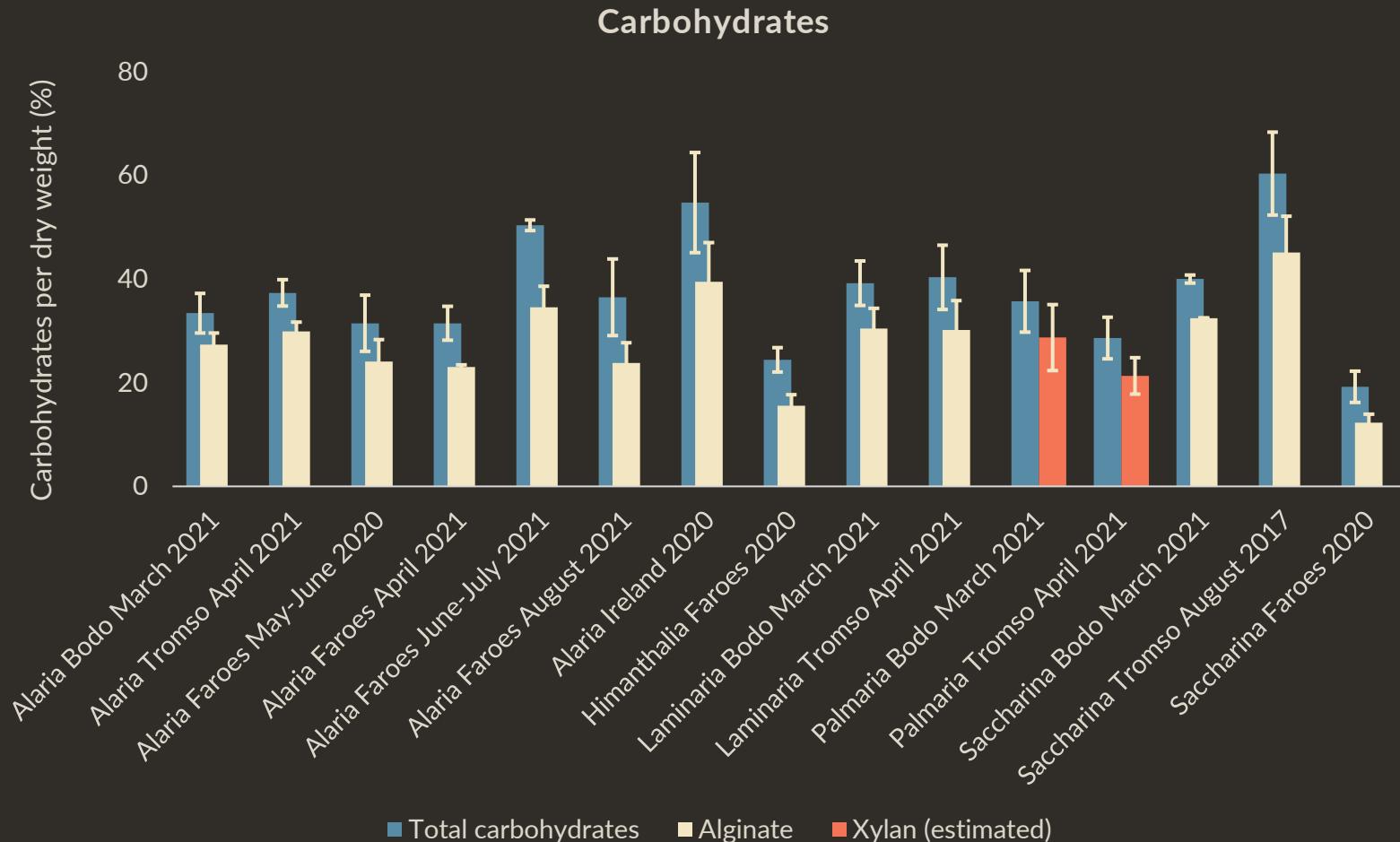
Energy, ash, C and N



Carbohydrate analysis

- Total polysaccharide hydrolysis by H_2SO_4
- Trimethylsilyl-derivatisation of monosugars
 - Renders the monosugars detectable by GC-MS

Carbohydrate analysis

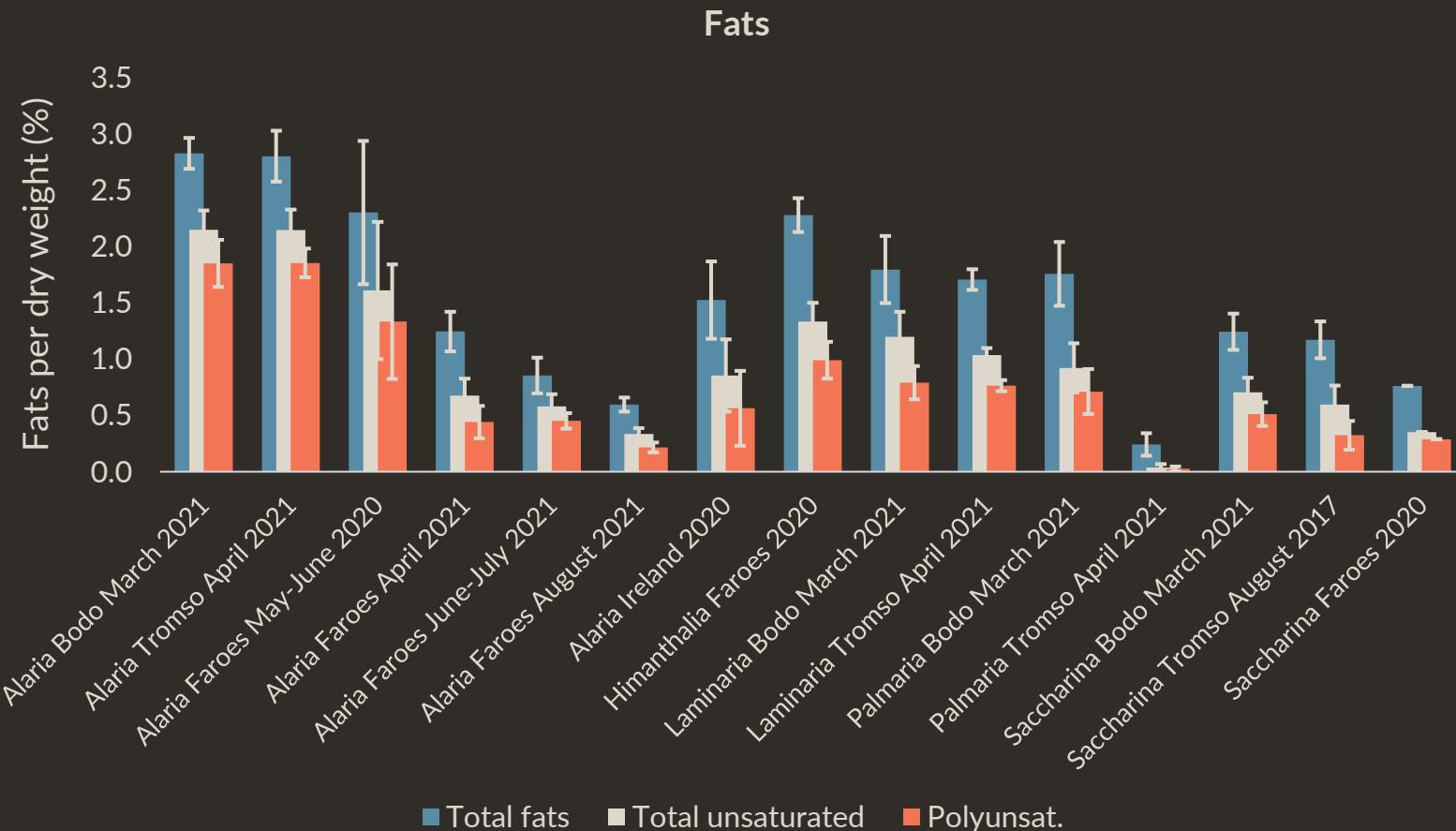


- Total carbohydrates range from 19.20 to 60.35 %DW
 - By far the most abundant macronutrient
- The vast majority is in dietary fibres
 - Particularly **alginate** in brown seaweed, **xylan** in red seaweed
- Negligible quantities of sugars, up to 1% of DW

Fatty acid analysis

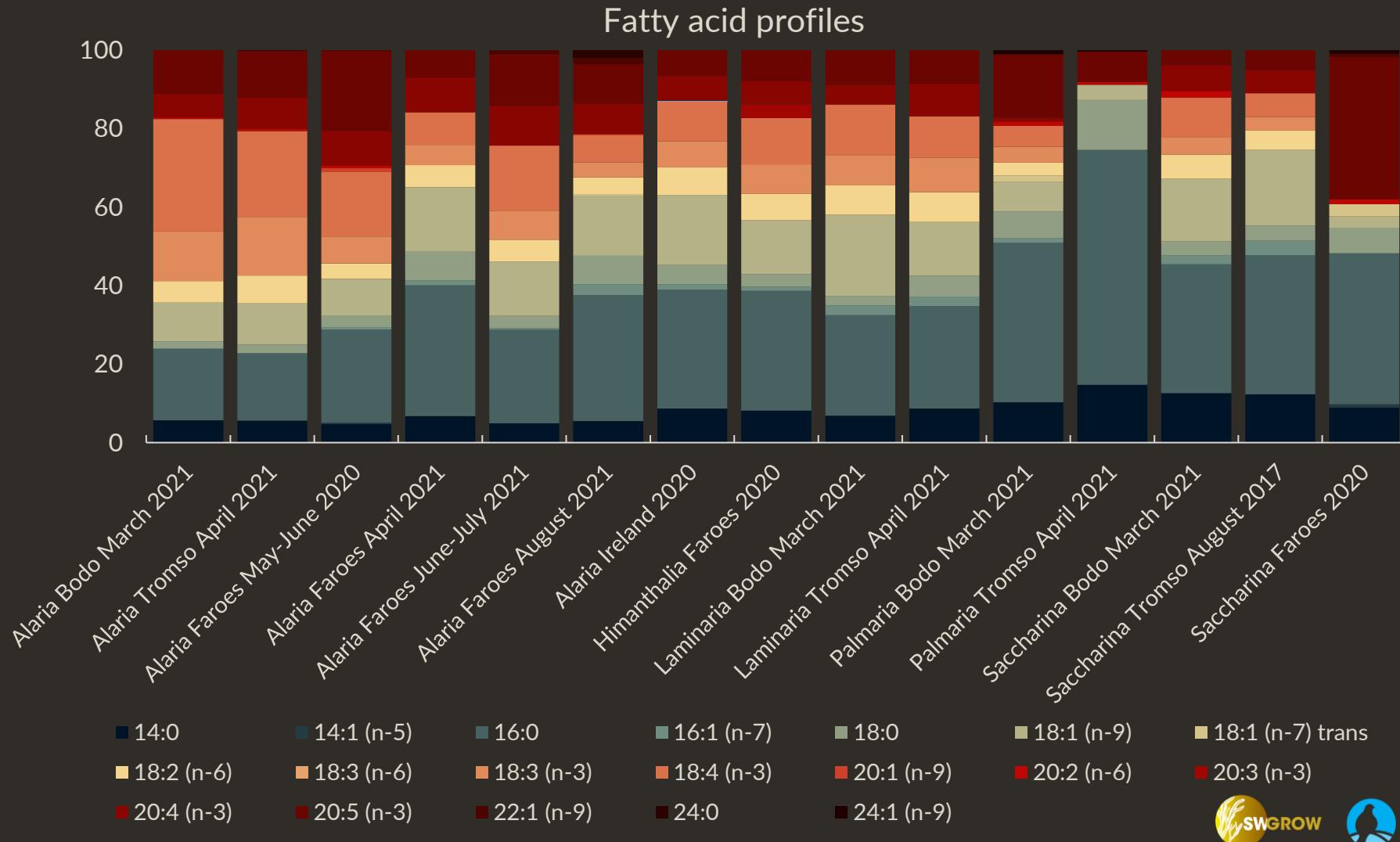
- Lipid extraction
 - Folch method, organic solvents
- Transesterification
 - Renders fatty acids detectable by GC-FID

Fatty acid analysis



- Total fats range from 0.24 to 2.83 %DW
- Majority of fats are unsaturated, and most unsaturated fats are polyunsaturated
- Most unsaturated fats are of medium chain length, i.e. 18-carbons
 - Particularly **α -linolenic acid (ALA)**, or 18:3- ω 3, and **Stearidonic acid (SDA)**, or 18:4- ω 3
- All contained small quantities of long-chain polyunsaturated fats, esp. **EPA**, or 20:5- ω 3

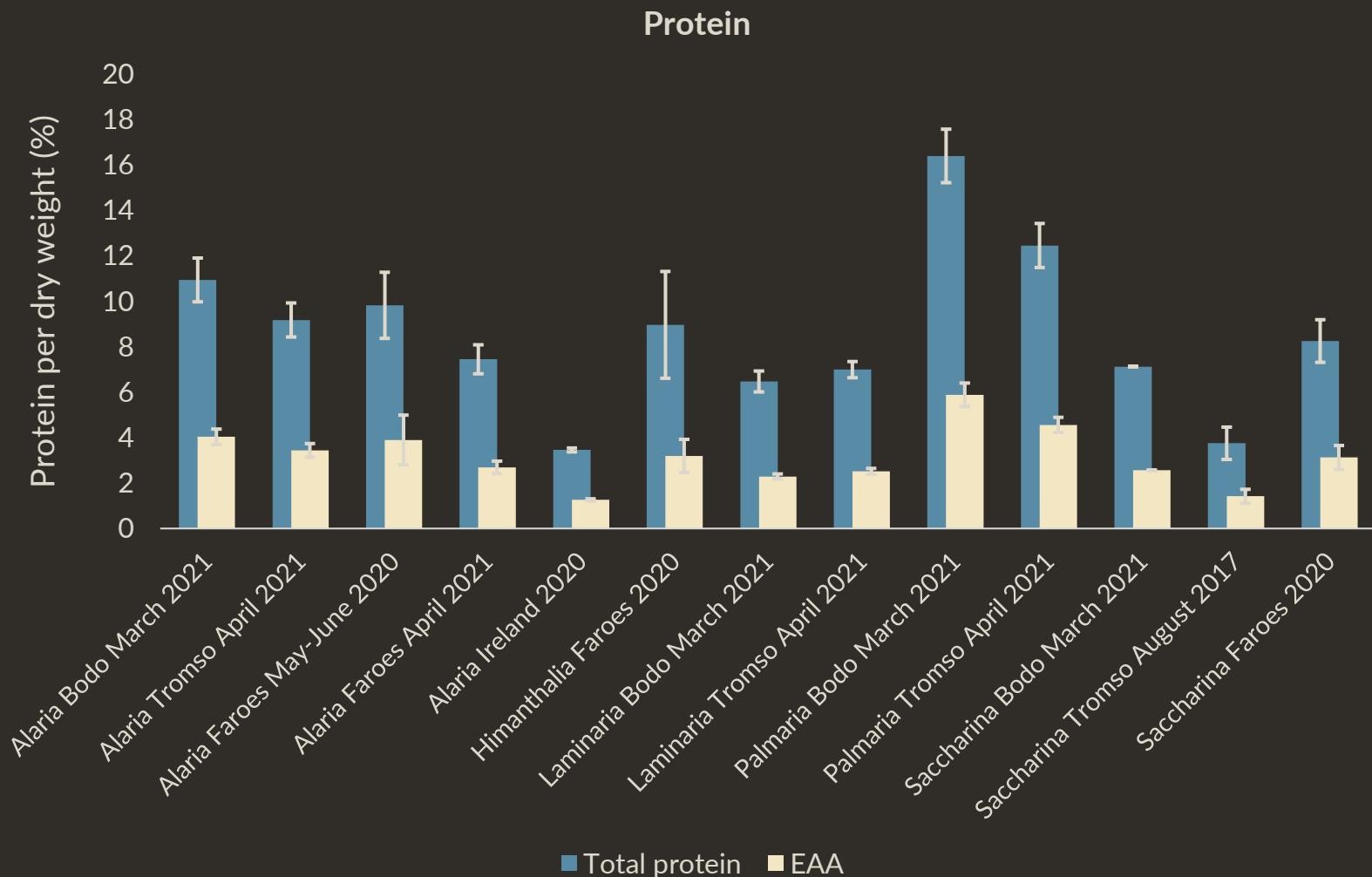
Fatty acid analysis



Protein analysis

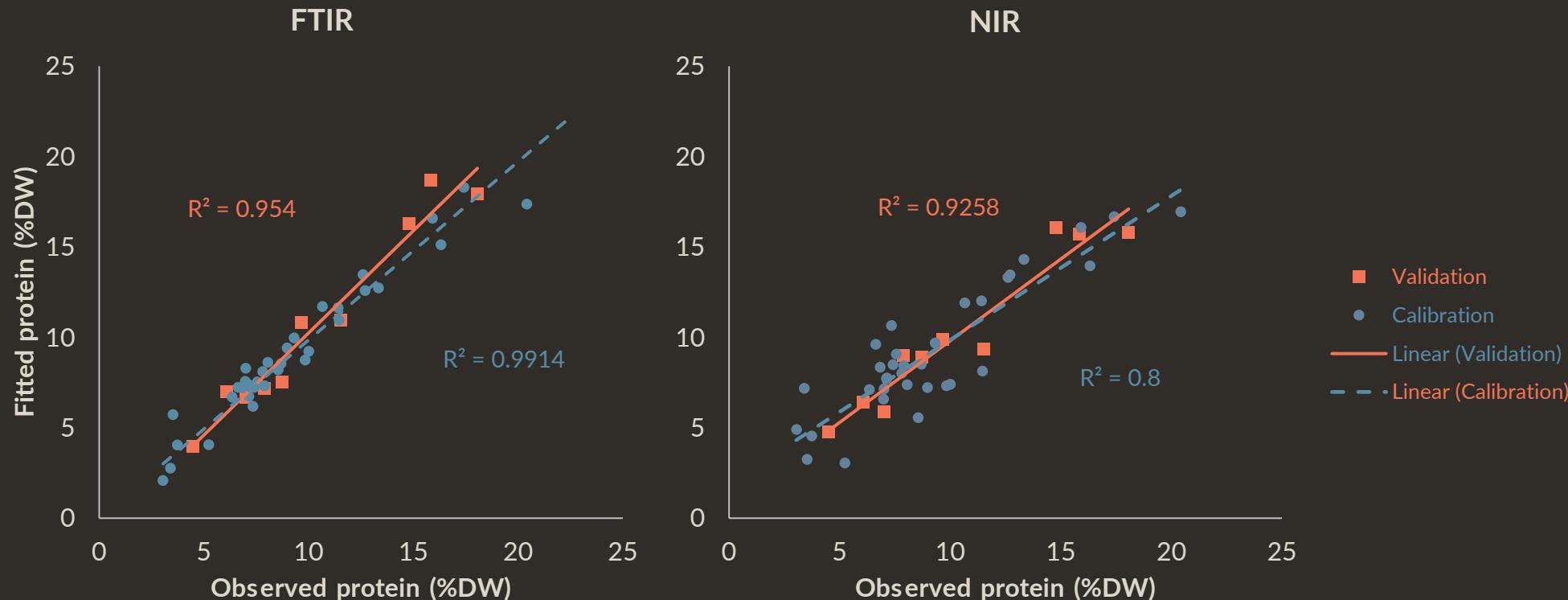
- Amino acid analysis by liquid chromatography tandem mass spectrometry (LC-MS/MS) at the Swedish Metabolomics Centre, Umeå, Sweden

Amino acids of seaweeds



- Total protein ranges from 3.46 to 16.39 %DW
- Essential amino acids range from 1.26 to 5.88 %DW
 - Eight of the nine essential amino acids are present (tryptophan excluded)
 - Particularly **Isoleucine** and **Threonine**
 - Followed by **Lysine**, **Phenylalanine**, **Valine** and **Leucine**
 - Small amounts of **Histidine** and **Methionine**

Spectroscopic protein estimation



Acknowledgements

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Thank you



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