The aim is to increase the value of Greenshell Mussel™ (GSM) based food export products. This will be achieved by determining the effect of these GSM products (and bioactives within) on improving joint and bone health while reducing inflammation. Cawthron Institute and Sanford Limited business led research. Through 4 objectives, we aim to develop the evidence dossier to make a general health claim for GSM food products. We will deliver at least 4 new, high-value functional food products for export.
## Greenshell Mussel Industry Exports

<table>
<thead>
<tr>
<th>Product</th>
<th>2015 Value (NZD$ - FOB)</th>
<th>2015 Volume (Kg)</th>
<th>Price ($/KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenshell Mussels</td>
<td>$256.7m</td>
<td>27,877,370</td>
<td>~$8-9</td>
</tr>
<tr>
<td>Mussel Oil</td>
<td>$32.7m</td>
<td>10,958</td>
<td>&gt;$3000</td>
</tr>
<tr>
<td>Freeze Dried Mussel Powder</td>
<td>$12.1m</td>
<td>255,192</td>
<td>~$50</td>
</tr>
</tbody>
</table>
Objective 1: To characterise known and novel active components of GSM using new high-throughput analytical capability.

Objective 2: To demonstrate the efficacy of GSM foods/ingredients using *in vivo* and *in vitro* models of inflammation, joint and bone health.
Objective 3: To develop targeted consumer-focused functional formulated foods containing GSM ingredients and to develop an anti-inflammatory activity index to assess the efficacy for GSM food products.

Objective 4: To determine the comparative nutrikinetics including the bioavailability of orally administered specific active ingredients from whole mussels, mussel extracts and novel functional foods in humans.
NIR – NEAR INFRARED SPECTROSCOPY
COMPOSITIONAL ANALYSIS OF GSM

Proximate analysis (i.e. fat, protein, glycogen, moisture)
Provides insight into:
- physiological status or condition
- quality (sensory properties, consumer acceptance)
- Further lipid analysis: EPA, DHA, other fatty acids

Applied to studies (to mussels) on:
- reproductive conditioning
- physiology and nutrition
- ecology
- genetics
- sensory analysis (taste, market acceptance)
PROXIMATE ANALYSIS (I.E. PROTEIN, FAT, GLYCOGEN, MOISTURE PLUS OILS)

Standard (chemical) lab techniques: Food lab
- Well established methods
- Precise and reproducible

However
- Costly ($500 per sample)
- Slow turnaround (e.g. week)

Rapid NIR analytical techniques:
- Fast (10 seconds), cheap, high throughput
- Method development ($$)
- Doesn’t need precision of lab methods
- Can determine – Fat, protein, glycogen, moisture, ash? EPA? DHA?

CAWTHRON INSTITUTE
INTRODUCTION TO NIRS

NIR absorption: associated with molecular vibration

NIR  (700 to 2500 nm)

NIR absorption of cookie dough
MODEL DEVELOPMENT (CALIBRATION)

Spectral data + Chemical data

Optimising the model:
- define scan region
- mathematical processing
- define # of factors
- outlier removal

Chemometric modelling

Develop model
80 GSM MUSSEL SAMPLE SPECTRA

Wavenumber cm⁻¹

Absorbance Units

Page 1/1
104 GSM MUSSEL PROVISIONAL RESULTS

$R^2$: 97.16

RMSECV: 0.312

RPD: 5.93

Bias: 0.00192
RESULTS - MUSSEL COMPOSITION

Female Site 1

Male Site 1

CAWTHRON INSTITUTE
RESULTS - OMEGA 3 CONTENT

Female Site 1

<table>
<thead>
<tr>
<th>Month</th>
<th>EPA</th>
<th>DHA</th>
<th>Other Omega 3</th>
</tr>
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<tbody>
<tr>
<td>April</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>May</td>
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<td>October</td>
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Male Site 1

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MUSSELING UP PROJECT

- Still early days (8 months in to a 3 year program)
- *In vitro* and *In vivo* trials (Just starting)
- Clinical trial (starting late 2017)
- Novel food products for export markets
10th AAOCS Biennial Meeting

Biotechnology, Lipidomics and Nutrition

Château Tanunda, Barossa Valley SA

Date 11-13th September 2017

For more information contact:

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