THE SCIENCE OF NOVACQ™ IN Penaeus monodon

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Outline

Ridley and CSIRO alliance

Novacq and other marine bioactives on:

1. Growth under different feeding regimes

2. Gut microbiome

3. Health markers
Ridley and CSIRO science alliance

Three post-docs focusing on

• Nutrition
• Immunity/health
• Proteomics

Novacq™: A novel aquafeed additive that uses natural microbial processes to increase growth, feed efficiency and health, and reduce reliance on fishmeal

• Relatively low in protein and high in carbohydrate and ash
• Greater than 30% increase in weight gain in monodon in tanks
**Marine ingredients**

- **Krill, squid, prawn meal**
  - Strategic ingredients in prawn feed
  - Improves growth, intake and feed conversion efficiency

- **Novacq™**
  - Source of microalgae, yeast, bacteria, living and dead organic matter, carbon, minerals
  - Improves growth, feed efficiency and survival

**Mechanisms?**

- **Feed attractant**
- **Complete source of micronutrients**
- **Unknown bioactives**
- **Nutrient utilisation**
- **Meeting a deficiency**
Communal growth trial

- 10 prawns/tank; 4 tanks reps/dietary treatment
- Iso-nitrogenous and energetic diets offered to communally-housed juvenile black tiger prawns for 6 weeks

### Dietary treatment

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<th>g/kg</th>
<th>Fishmeal</th>
<th>Krill meal</th>
<th>Krill hydrolysates</th>
<th>Novacq™</th>
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<td>Krill meal</td>
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<td>Micro-ingredients</td>
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</table>

Fed at satiation (120-140%) or restricted (70%)
Growth under different feeding regimes
Growth results

**Weight gain (g)**

Novacq™ bioactivity was enhanced when unrestricted-fed
Growth results

FCR (feed:gain)

- **Novacq™ obtained the best FCR**
- **Restricted-fed diets were more efficient but growth was poor**
Other parameters measured:

- Nutrient retention
- Apparent nutrient digestibility
- Protease and amylase activity
- Intake rate
- Gut evacuation rate
- Behavioural attraction assessment
Gut microbiome

Tansyn
Why look at the microbiome?

• Microbiome linked with numerous health conditions.
• Right balance between beneficial and non-beneficial bacteria.
• Diet influences microbiome
• Know diets especially Novacq improves growth and nutrient efficiency in prawns.
• Is this improved performance linked with having a unique microbiome?
• Used DNA sequencing to identify the bacterial community present.
Prawn gut microbial profile

- Highly diverse with 1435 different bacteria types found
- Diets have similar bacterial composition
- Varying levels of vibrios

- Broad-scale clustering based on similarity
- No clustering of samples due to diet
- Clear separation between the two feeding regimes
A closer look at some taxa

Both feeding regime and diet significantly influence specific taxa abundance.
Haemolymph health markers

Omar
Advanced understanding of prawn health and immunity using proteomics

- Simultaneous quantification of multiple target proteins currently 50 and increasing
- Application across various tissues
- Non-destructive blood sample
- Functionally relevant to prawn biology

Evaluate the effect of diet, environmental or pathogen challenge
Broad effects of Novacq

Unrestricted fed cohort

Consistent separation of dietary treatments
Expression of health markers

Higher expression means that homeostasis is not optimal. Energy potentially diverted into metabolic adjustments rather than growth.
THANK YOU
ANY QUESTIONS?

Special thanks
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• Dr James Wynne
• Dr Artur Rombenso
• BIRC and QBP staff

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