

TECH OFFER

Cost-Effective Okara-Based Shrimp Feed Formulation



KEY INFORMATION

TECHNOLOGY CATEGORY:

Sustainability - Food Security

Waste Management & Recycling - Food & Agriculture

Waste Management

Life Sciences - Agriculture & Aquaculture

TECHNOLOGY READINESS LEVEL (TRL): **TRL4**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO174820**

OVERVIEW

Feed cost generally accounts for 60% to 70% of the total production costs in an intensive shrimp aquaculture system. Fishmeal, which is often the main ingredient of shrimp feed, is one of the reasons for the high cost. It is also unsustainable to use fishmeal as it is derived from fish, contributing to the depletion of other fish species on a global scale.

The technology offer is an alternative protein source in shrimp feed that uses okara, a nutrient-dense side stream from soy milk and bean curd production. Direct application of unprocessed okara into shrimp feed may work, however, due to the presence of anti-nutrients, the absorption of protein and amino acids from the okara may be limited. The technology developer has formulated a shrimp feed with an optimum amount of processing to increase the digestibility and enhance the nutritional properties and at the same time lowering the cost of shrimp feed by up to 50%.

Currently, the developer has developed shrimp feed suitable for *L. vannamei* shrimp species with complete or partial replacement of animal protein which is fish meal.

The technology is available for IP licensing and IP acquisition as well as R&D collaboration with industrial partners who are keen to adopt the solution.

TECHNOLOGY FEATURES & SPECIFICATIONS

- Okara are high in insoluble fiber, proteins, unsaturated fats and isoflavones
- The okara-based formulation is optimised with minimum processing to increase the protein digestibility and enhance the bioavailability of nutrients
- Lower cost feeds using nutrient-dense side stream
- Shrimp fed with okara-based feed showed comparable growth rate as the group fed with commercial diet. There is an increase in the length and weight growth of the shrimp

POTENTIAL APPLICATIONS

The shrimp feed uses okara, which is rich in proteins, may help the local and Southeast Asian shrimp farmers to reduce the cost of shrimp farming as well as contribute to circular economy by using agro-industrial side stream.

The developed formulation is done based on *L. vannamei* shrimp, a high demand commonly consumed shrimp species in Singapore.

The nutritional composition can be tailored for different species, and maybe be applied to mollusks and fish as a feed ingredient.

UNIQUE VALUE PROPOSITION

An alternative nutrient source for shrimp feed allows for the sustainability of food supply and the reduction of food production side streams. Furthermore, it also reduces the fishmeal dependency on finite marine resources.

The processed okara serves as a cost-effective plant-based functional ingredient that helps to increase the growth rates and maintain the survivability of shrimps. At the same time, lowering the costs of feed for aquaculture farms without comprising shrimp health.

The technology is available for IP licensing and IP acquisition as well as R&D collaboration with industrial partners who are keen to adopt the solution.