

Policy Briefing

How can aquaculture feeds be improved to meet the needs of producers in Malawi?



The AgriTT programme is an innovative trilateral initiative between the UK Department for International Development (DFID), the Chinese Government, the Governments of Malawi and Uganda and the Forum for Agricultural Research in Africa (FARA). The programme facilitates the sharing of successful experiences in agricultural development with developing countries to improve agricultural productivity and food security.

AgriTT Pilot Development Projects work with small farmers, agricultural outreach agencies and policy-makers in Malawi and Uganda to introduce agricultural technology innovations from China and embed these in a value chain, of which farming communities will be the primary beneficiaries. **The Malawi Pilot Development Project** supports the development of the tilapia aquaculture sector.

 Agricultural Technology Transfer

Designing a comprehensive aquaculture feed trial

The aquaculture sector in Malawi makes an important contribution to food security, household nutrition and rural agricultural incomes. Fish farming businesses have the potential to become a dynamic sector of the economy. For this to happen a transformation is needed in the aquaculture feed subsector, as feed cost and quality is a critical determinant of aquaculture profitability.

AgriTT trialled a range of new aquaculture feeds in order to identify efficient but affordable feeds for promotion to Malawian fish farmers operating on a range of scales.

Aquaculture producers in Malawi can be split into three categories; those who can afford commercial level feeds, those that are interested in buying feed but cannot afford high end feeds, and those who cannot afford to purchase any commercial feed. The current feed market, dominated by feed produced by Malawian parastatal Maldeco and imported feeds, is not effectively meeting the needs of the majority of these producers and therefore it was clear the AgriTT pilot should research and test a range of new feeds with the objective of providing recommendations to the sector.

The Lilongwe University of Agriculture and Natural Resources (LUANAR) was responsible for the feed trial component of AgriTT. All feeds were developed by the LUANAR team with input from Chinese Technical Assistants (TA). The feed trial was split into three subcomponents:

A. Optimising feed quality and affordability through trials with

existing diets

Feed formulas were designed and tested based on existing, high end, commercial diets. Testing occurred with both starter and grower feeds that had a range of Crude Protein (CP) levels. Five feeds were tested; Bunda A, Bunda B, Bunda C, Maldeco formulation and Chinese formulation.

B. Replacement of imported ingredients with local alternatives in commercial feed

Seven feed formulas were designed to test a range of vegetable protein sources (these included soybean, sunflower, pigeon pea and groundnuts) and omit imported fish feed. The aim was to produce an effective feed at a more affordable cost therefore enabling a greater number of producers to utilise improved feed in their production regime to obtain improved yields and profits.

C. Improved local input feed for integrated smallholder fish farmers

This component explored options for producing un-milled feeds made from on farm agricultural wastes. These feeds can be promoted to poorer aquaculture producers that cannot afford or access commercial formulated feeds. The feeds were composed of a range of local ingredients including maize bran, legumes and small fish wastes.

Feeds were tested at five sites across Malawi in order to take into account, and understand, variance due to a range of ecological and climatic factors.

The five sites were as follows:

- Mzuzu Research Station (high altitude)
- Maldeco commercial farm, National Aquaculture Centre and LUANAR (mid altitude)
- Kasinthula Research Station (low altitude)

Experiments were all run in triplicate to reduce anomalous results.

After stocking, fish were sampled every 14-21 days. During sampling fish size and weight was measured and during the experiment period environmental variables, including, pH, temperature, dissolved oxygen and nutrient status were also gathered.

Several limitations to the research must be acknowledged and considered when assessing the findings. These include:

- Logistical difficulties in conducting the trial using all male fingerlings
- Resource constraints meaning sampling could not occur at each site on the same day, instead sampling was staggered across the period of a week.
- Time constraints that meant the trials only ran for two to three months, rather than a full six month cycle.

Initial findings of the experiments were as follows:

- Throughout the experiments, as expected, the Chinese formulation out-performed the other feeds on trial. This is mainly due to superior ingredients (fish meal and fish oil).
- The Starter diet 'D2' performed best from the Malawian feeds. D2 is a 42% crude protein Bunda formulation. Although the formula 'D1' has higher protein (46%) D2 has a higher proportion of carbohydrate.
- The Grower diet 'D1' consistently out-performed the other Malawian formulas. D1 is a Bunda formulation with a 40% crude protein value.
- Feeds that use a combination of protein sources, rather than a single source such as soybeans alone, performed best under the commercial feeds using local ingredients component.
- When considering unmilled feeds made from farm wastes, 'usipa' (small fish pieces) performed best followed by soybean, groundnut, and pigeon peas. Sunflower, cowpeas and beans, underperformed in comparison.
- Throughout the experiments, higher growth rates were seen at Kasinthula and Maldeco, with lower growth rates at Mzuzu. This is to be expected and can potentially be related to average temperatures, linked to the altitude of the sites.

Policy recommendations

- **Although the feed trials show initial results, their short duration and the need for scientific rigour means that the trials should be repeated for a second production cycle.**
- **The element of the feed trial testing un-milled feeds using farm waste ingredients needs to be expanded.** Testing should occur at a nationwide level. Formulas should be increased to include varying ratios of ingredients as well as the use of rice bran (alongside maize bran) as this is commonly found in certain regions of Malawi.
- **The most promising feeds need to be taken forward and tested at farmer level to check for consistency in results and to determine the feeds that can be taken to scale** and recommended and sold at the national level.
- **When feed formulas are recommended for roll out, both the availability of selected ingredients and the cost of production and sourcing must be taken into account through an economic analysis.**



AgriTT has given us the opportunity to research feeds that can help all aquaculture producers in Malawi. If these feeds are utilised in the way in which we hope then real gains in income and nutritional status will be realised.

Dr Daniel Sikawa,
LUANAR



Partner

Lilongwe University of Agriculture and Natural Resources, Malawi

Contact

Dr Daniel Sikawa
Lilongwe University of Agriculture and Natural Resources
danielsikawa@gmail.com

Dr Steve Donda
Deputy Director of Fisheries, DoF
stevedonda@gmail.com

Elle Harrison
Programme Coordinator
ElleH@landell-mills.com

www.agritt.org
 twitter.com/agriTTprogram



Ministry of Commerce
and Ministry of Agriculture