

# Policy Briefing

## Optimising production and marketing of farmed tilapia in Malawi



The AgriTT programme is an innovative trilateral initiative between the UK, Chinese, Malawian and Ugandan governments and the Forum for Agricultural Research in Africa. This UK Department for International Development funded programme facilitates the sharing of successful experience in agricultural development with developing countries to improve agricultural productivity and food security.

AgriTT Research Challenge Fund aimed to generate new thinking and practice for technology transfer and value chain enhancement, through 2 year trilateral research projects, each with a UK, Chinese and African or Southeast Asian research partner.

### Adapting successful Chinese practices for local value chains

**There is great potential for developing aquaculture in Malawi, with strong consumer demand for fish, high prices and plenty of suitable sites.** But currently aquaculture accounts for just 3% of Malawi's total fish production for human consumption. Aquaculture in Malawi has been greatly affected by droughts in recent years, limiting fish farmers to one cycle of fish production per year.

**In contrast, aquaculture's contribution to the global supply of fish for human consumption overtook wild-caught fish for the first time in 2014.** China is the world's leading producer of aquaculture fish, contributing over 60% to 2014's world fish production. Thus lessons from China identifying opportunities for better practice could contribute to developing aquaculture in Malawi.

**This research investigated the optimum feeds and feeding strategies for tilapia (*Oreochromis shiranus*)** to inform AgriTT's wider Pilot Development Project<sup>1</sup> on enhancing tilapia value chains in Malawi. The study design was informed by small-scale farmers from Dowa and Mchinji and by a large, semi-intensive commercial farmer (MALDECO Aquaculture Ltd). Feed is the major production cost in Malawi, accounting for approximately 60% of the total aquaculture production cost. Due to this expense, most farmers in the country feed their fish on maize bran, which normally results in low fish growth rates.

**Trials were conducted to compare the performance of different tilapia feeds.** Three proven tilapia feed types from China, Zambia and Malawi, as well as maize bran as control, were tested. Results showed that fish receiving the Chinese feed grew 40% more than those receiving the Malawian feed and 176% more than those fed on maize bran (Figure 1; Table 1). Results for Malawian and Zambian feed were not significantly different. As well as the constituents of feed, physical properties and pellet size are likely to have an effect on fish feeding and growth: floating pellets do not disintegrate as easily as those that sink, and smaller pellets are easier for fish to grasp. A cost-benefit analysis revealed that it would be too expensive for local fish farmers to import Chinese feed, so further work is needed to develop a similarly successful feed using locally available ingredients.

**The optimum feeding frequency and rate for tilapia were determined through laboratory studies.** Feeding three times a day resulted in the highest growth rate and significantly affected the feed utilisation, growth performance and body composition of fingerlings. The optimum feed rate was 6% of body weight. Further work is needed to refine these results in a fish farm environment.

**The natural feeding habits of tilapia were studied in order to develop low-cost diets and prevent wastage of feed.** Pond ecology studies using carbon isotopes revealed that tilapia prefer natural foods when they are smaller, and switch to supplemental feeds at a later stage. Thus farmers need to intensify manure application when fish are small to stimulate natural productivity.

Feed	Final fish mean weight gain (g)	Feed properties		
		Average crude protein level (%)	Buoyancy	Size and form
Chinese	108.0	40	Floating	Smaller granules
Malawian	77.1	30	Sinking	Larger pellets
Maize bran (control)	39.0	9	Semi-sinking	Powder

**Table 1 Fish weight gain results of on-farm experiments with the use of proven feeds and feed properties**



**Figure 1 Visible improvement – 2 months' weight gain comparing tilapia fed on (A) Chinese and (B) Malawian formulations, and (C) low-cost maize bran**

**With improved market information collected by the project, farmers can now access higher-value markets.** For example, farmers now charge up to 1,500 kwacha (MK), the equivalent of US\$ 2, per kg at district and local markets compared with just 500 MK (US\$ 0.68) per kg when selling at the farm gate<sup>2</sup>. Based on the findings of two market surveys to assess consumer preferences, producers and retailers are able to segment consumers

<sup>2</sup> US dollar figures are based on the exchange rate at the time of writing.

of fresh tilapia and thus to improve their product marketing and understanding of growth opportunities. For example, the average consumer is willing to pay more for fresh tilapia sold per piece (rather than per kg). Armed with this knowledge, farmers and marketers can aim to sell preferred products for higher prices. The project also carried out field studies to assess opportunities and constraints to investment, revealing a need for improved fresh fish facilities such as ice-producing machines and refrigerators in the common markets.

**Involvement of the private sector at the planning stages ensured knowledge sharing and capacity building between small-scale farmers and MALDECO, with research results that are relevant to end users.** This has greatly assisted with disseminating the production and marketing information generated. The results on feeding regimes have already been adopted by some small-scale fish farmers, and further tests are being carried out by MALDECO. The project has also formed links with the New Partnership for Africa's Development (NEPAD)'s Pan-African Fisheries Aquaculture Working Group and with the IOC-SmartFish Programme. Work on this project has contributed to LUANAR being designated a World Bank Africa Centre of Excellence in Aquaculture and Fisheries.

## Part of a bigger picture

- **These results have contributed to AgriTT's ongoing Malawi Pilot Development Project on enhancing tilapia value chains.** This research has generated evidence that, with proper management, feed and feeding strategies, tilapia has potential for high performance in Malawi.
- **To stimulate investment in medium-scale fish farming, an appraisal is currently being conducted of the capacities potential investors will need to have.** This includes a preliminary assessment of the technical, managerial and financial capacities of prospective investors, and the local structures and support available to them.
- **MALDECO is now using the market survey results as part of its marketing strategy.** The results are also being shared with other players in the private sector, including feed manufacturers, fish producers and other interested stakeholders.



**The project has responded to some very critical knowledge gaps in the aquaculture sector in Malawi.**



## Partners

### China

Freshwater Fisheries Research Center (FFRC), Wuxi

### Malawi

Lilongwe University of Agriculture and Natural Resources (LUANAR), Bunda Campus

Innovative Fish Farmers Network Trust (IFFNT), Lilongwe

National Aquaculture Centre (NAC), Malawi Government Fisheries Department, Zomba

MALDECO Aquaculture Limited, Mangochi

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