Milkfish *Chanos chanos* cage culture operations

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FOREWORD

SEAFDEC/AQD has long worked on milkfish *Chanos chanos*. Traditionally raised in ponds, it is economically important in at least three countries in Asia and the Pacific: Philippines, Indonesia and Taiwan. Milkfish research and development was pioneered by researchers at the Oceanic Institute in Hawaii (USA), Tungkang Marine Laboratory in Taiwan, and AQD in the Philippines.

Much has happened since the first breakthrough in spontaneous natural spawning in 1980 at AQD’s Igang Marine Station and the subsequent completion of the life cycle of milkfish in captivity in 1983. AQD was able to develop breeding and hatchery technologies and extended these through the Philippine government’s NBBP (National Bangus Breeding Program, 1981 to 1995) and through AQD’s own training courses on milkfish hatchery operations & management (starting 1984) and marine fish hatchery operations & management (offered yearly since 1987). AQD also developed a milkfish grow-out diet in 1997 and larval diet in 1995. By and large, AQD first supported its own cooperators (private hatcheries first mass-produced fry in 1991) until almost all production of milkfish fry now in the Philippines are from hatcheries. The latter is important considering the expansion of milkfish culture from brackishwater ponds to marine cages after mariculture parks were set up in several parts of the country (eg. Pangasinan, Guimaras, Negros Oriental, Cebu, Leyte, Misamis Oriental, Davao). These parks can produce a tremendous volume of fish, much more than brackishwater fishponds.

The intensification of milkfish culture is not without consequence. Without safeguards, the financial risk to fish farmers is greater and the cost to the environment potentially higher (ie. pollution). AQD hence signed a partnership agreement on 21 March 2011 with Taytay sa Kauswagan Inc (TSKI) to implement a technical assistance project under DBP-SMIP (Development Bank of the Philippines - Sustainable Mariculture Investment Program) funded by NORAD (Norwegian Agency for Development Cooperation). The technology extended was mostly based on practices developed and followed at AQD’s Dumangas Brackishwater Station for milkfish nursery in ponds and AQD’s Igang Marine Station for milkfish cage culture.

This manual recounts how the milkfish farmers in southern Mindanao (Panabo City, Davao del Norte; Malalag, Digos; Sta. Cruz, Davao del Sur) who participated in DBP-SMIP, and the partner-farmers in the AQD-Petron project in Nueva Valencia in Guimaras, came to succeed. The manual describes the procedures the farmers followed in operating and managing sea cages: nursing fry & buying fingerlings, transport, stocking, feeding, cage maintenance, and fish harvest. More importantly, it summarizes the water and sediment quality monitoring and evaluation scheme so that farmers can have an early warning system and ensure sustainable production.

We hope that this manual will inspire and teach new investors or farmers who think of expanding operations that feeding the world and safeguarding the environment are not opposing forces but faces of the same coin.

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INTRODUCTION

The culture of milkfish (*Chanos chanos* or “bangus”) is the largest fish aquaculture industry in the Philippines. Milkfish continue to be a top aquaculture commodity primarily because they are easy to culture and can be grown in a wide range of environments. They thrive in freshwater, brackishwater, marine and even hypersaline habitats. Milkfish production is increasing rapidly with much of the production moving away from traditional culture in brackishwater ponds to fish cages in coastal marine waters.

Milkfish culture has been practiced in the Philippines, Indonesia and Taiwan for centuries and has been the focus of aquaculture research in a number of institutions for several decades. Innovations in culture practices based on research data and farmer’s experiences have been adopted by industry practitioners and these are documented in the book entitled *Milkfish Aquaculture in Asia* authored by Liao & Leano in 2010. In general, the full production cycle of milkfish from induced spawning & hatchery operations to pond nursery and cage grow-out culture can take 7-10 month.

<table>
<thead>
<tr>
<th>Larval stage 1-21 days</th>
<th>Nursery stage 60-75 days</th>
<th>Grow-out stage 4-6 months</th>
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<td>Hatchery-reared fry</td>
<td>Fingerlings produced in earthen nursery ponds</td>
<td>Market-sized fish from cage culture</td>
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Recent concerns about the rapid growth of aquaculture, possible environmental impacts, and risks that can threaten the sustainability of this expanding industry have also been the subject of many conferences with the end view of developing good management practices in aquaculture. The principles and guidelines on better management practices in marine fish culture are included here.

BIOLOGY

Milkfish are:
- **filter feeders** – they have no teeth but have fine gill rakers that concentrate plankton
- **benthic feeders** – they nibble or feed on adhering as well as floating blue green algae *lab-lab* or filamentous algae *lumut*
- **daytime feeders** – but they do feed at night, but feeding activity is less than that during daytime