

Semi-intensive culture of MILKFISH

Over the years, there has been a big steady demand for milkfish or bangus in the country. It has also been doing well in the international market with Philippine export of frozen or chilled bangus reaching over 526 metric tons or some P8.5 million annually.

The following gives a good overview of how to manage your own fishponds using a site already developed.

Site selection

Select existing brackishwater fish farms that are fully developed and operational. Former prawn farms can be used for milkfish farming. The site should have:

- high tidal range and can hold water at least one meter deep;
- good water quality and more or less have constant salinity and temperature throughout the year;
- longer dry season, sandy clay loam, silty clay loam; and
- access to roads and power supply.

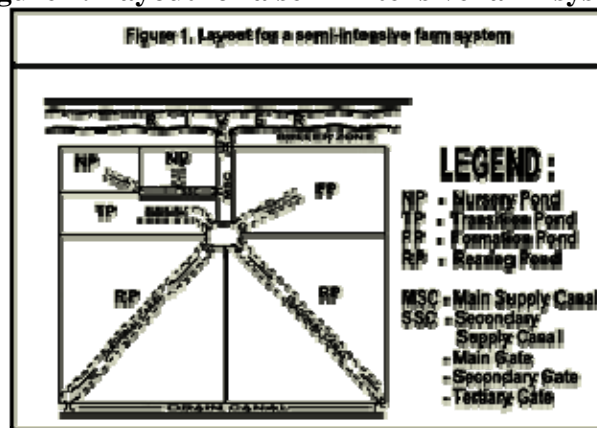
Pond layout and design

1. Improve or modify existing structures to suit the management requirements of the proposed production scheme.
2. Concentrate on the repair and strengthening of dikes, cut-and-fill levelling of pond bottom, and construction of diagonal canal, drain canal and drain culvert gate to improve pond structures.
3. Modify pond structures to improve water management and stock manipulation systems as well as to meet desired management schedules and production targets. The pond can be of any size (the bigger, the better) for optimum production using the modular

method.

4. Divide pond into four compartments: nursery pond (NP); transition pond (TP); formation pond (FP); and rearing pond (RP).
5. Provide a separate culvert-type drain gate and canal system opposite the inlet gate and canal system for rearing ponds to effect efficient water exchange and circulation.
6. Construct an inside-pond diagonal canal to facilitate draining and harvesting of stock.

Figure 1. Layout for a semi-intensive farm system



Pond preparation and food requirements

1. Carry out thorough pond preparation such as crack drying, liming and tilling once a year.
2. Prepare the ponds grown with *lab-lab* before fish stocking.
3. Apply organic and inorganic fertilizer to stimulate growth of natural food organisms.
4. Extend pond preparation and food growing in grow-out ponds to 45 days to allow more time for the abundant growth of *lab-lab*.

Figure 2. Schedule of pond preparation and food growing

Activities	Cumulative days for completion of activities
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1. Pond draining, soil sealing, leveling and repair	1 2-7 2 2
2. Pond drying	2
3. Gate screening	7
4. Pest predator control	8 8
5. Liming (optional for low pH)	8-17 11
6. Washing	18
7. Organic fertilization (2 tons/ha)	18 25 25
8. First water intake, 5 cm	32
9. Evaporation	39
10. Inorganic fertilization 3 sacks/ha 21-0-0	39 45 46
11. Second water intake, 10 cm	
12. Fertilizer dressing, 25 kg/ha 16-20-0	
13.	
13. Third water intake, 15 cm	
14. Fertilizer dressing, 25 kg/ha 46-0-0	
15. Fourth water intake, 20 cm.	
16. Fertilizer dressing, 25 kg/ha 16-20-0	
17. Sixth water intake, 25 cm 18.	
18. Fertilizer dressing, 25 kg/ha 16-20-0	
19. Sixth water intake, 30 cm	
20. Fish stock	

Production strategy

1. Purchase the required fry once every year of operation, especially during the peak season in May.
2. Start production in the nursery pond, then the transition pond, formation pond, and finally the rearing pond.
3. Divide the grow-out process into two phases: formation and rearing phases.
4. Allow the fingerlings to grow from a 20 g fingerling size to a 50 g post-fingerling size in the formation pond using natural food organisms as primary food for the stock.
5. Transfer the post-fingerlings to the rearing pond. Milkfish will grow to the marketable size of 250 g in three months at an average growth rate of 2.2 g/day. Expect the milkfish to grow bigger during the dry season at an average growth rate of 3 g/day.
6. Provide supplementary feeds to sustain fish growth particularly during the wet season when *lab-lab* and other natural foods in the pond are depleted. A weekly feed conditioning is necessary to determine the attractability of the feed.
7. Efficient feeds should be used. Unattractive feeds result in poor health of the milkfish.
8. Eradicate snail pests called *suso* and bangunon. These pests destroy *lab-lab* mat and compete with bangus for *lab-lab*. Use alternative molluscicide, like tobacco dust, applied at 300-400 kg/ha or collect the snails by sweeping or handpicking and burn them with rice straw.

Pond water management

1. Increase water depth from 0.6 m to 1 m particularly during the last two months of culture operation. **Note:** An abrupt increase in water depth will cause *lab-lab* to detach and float. Install fine-meshed screens (bastidor or lumpot) at the gates to prevent the re-entry of wild species or the possible escape of stock.
2. Monitor water quality parameters (turbidity,

salinity, dissolved oxygen, temperature regularly to check for any sign of risk.

Maintain the optimum water condition to support maximum growth of milkfish.

3. Change water at least every two weeks or as frequent as possible.
4. Install a stand-by water pump to maintain desired water depth when water management through tidal fluctuation is not possible.

Figure 3. Stocking Density

Pond	Stock
NP	40 fry/sq m
TP	5 fingerlings/sq m
FP	2 juveniles/sq m
RP	1 grown fish/sq m

Figure 4. Milkfish Production Schemes

Pond	Growing stage (wt-g)	Culture period (days)	Growth rate (g/day)	Food type	Harvest size (pc/kg)
NP	0.02-.05	30	0.016	Lab-lab	2000
TP	0.5-10	30	0.32	Lab-lab Bread crumbs	100
FP	10-40	30	1.00	Lab-lab Bread crumbs	20
RP	50-215	75	2.2	Lab-lab/Pellets	4.6
Dry	50-275	75	3.0/higher	Lab-lab/Pellets	3.6

Figure 5. Feeding Requirement Scheme

Pond	Growing size (g)	Feed type	% Feed rate (Biomass)	Feeding frequency
NP	0.02-.05	Lab-lab Starter mash	8-10	5x/day

TP	0.5-10	Lab-lab Bread crumbs/rice bran	5-8	4x/day
FP	12-50	Lab-lab Bread crumbs	4-5	3x/day
RP	50-100 100-250	Lab-lab/algae Finisher Pellets	3	3-4x/day

Figure 6. Nutrient Requirements of Milkfish Feed

Nutrient	Suggested level	Typical source
Crude protein	25-40%	Fish meal, soybean, corn, glutenmeal, ipil-ipil
Crude fat	7-10%	Vegetable and fish meal
Nitrogen Free-extract (Digestible carbohydrates)	25%	Yellow corn, cassava meal, rice and wheat bran, flour
Crude fiber	<8%	
Vitamin, minerals mix	3-6%	
Metabolized energy	>3,200 kcal/kg	

Figure 7. Water Quality Parameter

Parameter	Optimum level
• Dissolved oxygen concentration	3-5 ppm
• Temperature	22-35 degree C
• pH level	6.8-8.7

• Salinity	18-32 ppt
• Turbidity	0.5 m

Do's and Dont's in setting up and managing a fish pond.

- Avoid areas with problems of domestic, industrial, or agricultural pollution.
- Ensure sufficient supply of clean water.
- Put up independent water supply.
- Apply complete drying, and if indicated, liming of sediments.
- Always stock good quality fingerlings.
- Practice right stocking density according to management capability and environmental conditions.
- Maintain high quality water supply.
- Always ensure sufficient water exchange.
- Avoid adding large volumes of new water that may contain pollutants (setting of water in reservoir before use can improve its quality).
- Set regular water quality monitoring (e.g., turbidity, water color, dissolved oxygen, pH and temperature) activities.
- Anticipate adverse weather conditions. Sudden rain or thunderstorms during hot day may present dangers as well as sudden changes in water temperature which may also result in some *fish kills*.
- Observe extra precaution to minimize the possibility of dike wash-out flooding and the like.
- Apply controlled feeding and feed fish only with high quality food.
- Monitor survival rate, biomass, growth and health.
- Quarantine new stock.

Harvesting

Harvesting milkfish that have attained the marketable size can be done either through the current method locally called as *pasubang* or the total draining method. Total draining is the common method for

harvesting milkfish. However, this lowers the quality of the fish because mud sticks to the fish.

To maintain fish quality, the *pasubang* method can be used. This takes advantage of the tendency of the fish to swim against the current. The method is carried out by draining water in the pond particularly during low tide to induce fish to swim through the gate.

Close the gate when all the fish have been impounded. Total harvest is done manually by collecting or picking the remaining fish from the pond bottom.

Packing for transport

Part of the business is transporting the goods to the market. To ensure that fish will remain fresh until they reach their destination, they must be packed with sufficient quantity of ice and loaded with care.

Methods of packing fresh fish for transport

1. Wash the fish with pond water prior to icing and sort according to size.
2. Pre-chill or immerse the fish in a chilling tank, box or *banyera* with ice water immediately after harvest.
3. Dip the fish in ice water before packing to keep them from losing scales due to subsequent handling.
4. Spread a layer of crushed ice 15 cm thick at the bottom of the transport box. Make sure the ice is compact to minimize thawing and to cushion the fish.
5. Lay about 100 kg of the fish on top of the crushed ice. Arrange the fish heads pointing to the one direction only.
6. Spread another layer of crushed ice 5 cm thick on top of the fish.
7. Repeat steps 2 and 3 until the last layer of fish is 15 cm below the top of the box.
8. Place the last layer of crushed ice 15 cm thick on top of the last layer of fish. The bottom and the top layers of ice should always be 15 cm thick.

Note: If the fish will be transported by land, a 1:2 ratio of ice to fish (weight basis) is needed for 1 1/2 hours of travel, and a 1:1 ratio for 3 hours of travel. However, if transporting by boat or ship, do not remove fish from the styrofoam boxes. The fish can stay fresh in a styrofoam box for 12 hours.

Advantages of pre-chilling

Pre-chilling the fish will prevent excessive damage and will keep the fish looking fresh. It also removes blood, slime, dirt and bacteria from the skin of the fish, and slows down enzymatic activities, thus minimizing further deterioration.

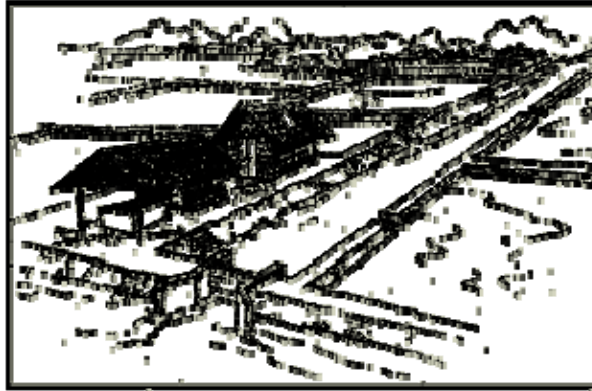
Ecological considerations

If not properly planned or managed, fishponds may adversely affect the environment, e.g. by causing water pollution. To mitigate such problems, adopt appropriate safeguards to protect the environment. Likewise, avoid pond development in environmentally critical areas such as mangrove areas, marine parks, and reserves, and sanctuaries. If possible, use teaseed cake/powder instead of strong chemicals in controlling pests and predators in fishponds. If chemical pesticide is used, count five to seven days before flushing pond water into the river to avoid polluting the river and poisoning other aquatic organisms. Furthermore, avoid overfeeding the fish with commercial feeds. Decaying uneaten feeds can pollute water and pond environment.

Plant mangroves or other trees on the dikes to strengthen them and to avoid erosion. Dikes can also be planted to cash crops, e.g. string beans, kamote, okra, and peppers.

Support services

Technical assistance can be requested from the Bureau of Fisheries and Aquatic Resources (BFAR-DA) and the Coastal Environment Program of the Department of Environment and Natural Resources (CEP-DENR).



Perspective of A Semi-Intensive Pond For Milkfish

Source: Sustainable Livelihood Option for the Philippines,
Department of Environment and Natural Resources
Livelihood options for Coastal Communities
Vol II IRR and SMISLE Publications - BFAR
Reference: MARID Agribusiness Digest
September and October 1999

BANGUS DEBONING AND FISH Recipes

BONELESS BANGUS

Procedure

1. Wash the fish.
2. Split the fish, butterfly style.
3. Remove the internal organs, gills, blood and slime. Then wash the fish thoroughly.
4. Remove the backbone and dorsal fins by means of a sharp knife.
5. With the use of forceps, remove the spines at the belly cavity. This can be done easily because the spines are superficially embedded.
6. Debone.

Make a superficial slit along the dent of the dorsal and ventral muscles with the edge of a knife. Remove spines one after the other by inserting the pair of forceps between the segments of the dorsal and ventral muscles.

Continue removing the spines in similar manner on the dorsal and ventral areas until all spines are eliminated.

From the dorsal portion, there are approximately 44 branching spines embedded between the muscle segments. Starting from the nape along the lateral line 22 spines are embedded and along the ventral muscles are 24 spines.

SMOKED SOFT- BONED BANGUS

Procedure

1. Remove the gills and open the soft belly to remove the internal organs.
2. Wash fish thoroughly to remove blood, slime, dirt, etc.
3. After washing, soak fish in concentrated brine for 120 minutes. To prepare concentrated brine, mix thoroughly 1 part salt and 3 parts water.
4. Drain brined bangus for a few minutes, wrap in aluminum foil and then process in a retort or pressure cooker at 10 lbs. pressure for an average time of 90 to 120 minutes. Processing time varies according to size and age of bangus.
5. After processing, "dry to the touch" under the sun for 30 to 48 minutes or in any suitable artificial dryer.
6. Smoke the processed fish in a suitable smokehouse for 30 to 45 minutes until golden brown.

BANGUS SARDINES**Ingredients**

1 1/2 kilo bangus
2 1/2 cups water
10 tbsp vinegar
1 1/2 cups cooking oil or corn oil
1/2 bottle tomato catsup
2 medium carrots
10 pcs kamias
2 tbsp salt
4 tbsp sugar
1 large can tomato chili sauce

Procedure

Mix all ingredients in a pressure cooker and cook for 45 minutes or until soft.

BANGUS PAKSIW**Ingredients**

1 fresh fat bangus, about 1 lb.
1 small ampalaya (quartered)
1 small eggplant (quartered)
3 pcs hot green pepper
Salt or patis to taste
1 cup vinegar
3/4 cup water
1 pc inch-long ginger

pounded

Procedure

Clean bangus without removing the scales. Cut into 2 or 3 pieces. Salt pieces and set aside. Prepare vegetables. Arrange fish and whole pepper over the vegetables. Add vinegar. Bring to a boil without stirring. Add water and continue simmering until fish is cooked. Add patis to taste.

BULANGLANG WITH BANGUS

Ingredients

1 bangus (broiled whole)
1/2 cup sliced onion
2 small eggplant, halved
1 small ampalaya, quartered
1/2 cup 2-inch slices sitao
1/2 cup malunggay or sitao tops
1/2 sliced tomatoes
1 cup rice washing
Bagoong to taste

Procedure

Place eggplant, ampalaya, sitao, onion, tomatoes with rice washing and bagoong in claypot or saucepan. Bring to a boil. Add fish and malunggay or sitao tops. Cover to simmer until vegetables are just crisp-tender.