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Recent Developments in PRAWN POND CULTURE



F.D. APUD



AQUACULTURE DEPARTMENT
SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER
Tigbauan, Iloilo, Philippines

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RECENT DEVELOPMENTS IN PRAWN POND CULTURE*

METHODOLOGY AND ECONOMIC ASPECTS OF DIFFERENT CULTURE SYSTEMS

This document presents the recommended methodology, nominal projections and partial costs and returns, for extensive prawn culture at two production objectives, and semi-intensive culture with costs and returns breakdown for three production targets. Intensive prawn culture procedures are not discussed.

Extensive Prawn Culture System I projects a production yield of about 110 to 160 kg/ha/crop or more in four months and survival rate of from 65 to 70%. The extensive Prawn Culture System II aims for a production rate of about 230 kg/ha/crop in four months at about 70% survival with expected average body weight of about 25 grams. The procedures indicated have been verified and are now widely practised.

Production targets under the Semi-intensive Prawn Culture System I range from 350 to 500 kg/ha in four months at survival rate of about 70 to 75% and expected average size at harvest of about 28 to 30 pcs/kg. This method has been confirmed at different collaborative sites using the modified SEAFDEC diet developed by the Feed Development staff of the SEAFDEC Aquaculture Department.

A. Extensive Prawn Culture System I.

1. Site Specification

Water Source

- a. Brackishwater : Must be available in sufficient quantity the whole year round.
- b. Freshwater : A fresh water source is essential.

*To be included in the revised edition of EM No. 5: Farming of Prawns and Shrimps.

Environmental Conditions

- a. Salinity : Sugpo grows best at the salinity range between 10 and 25 ppt.
- b. Temperature : Best temperature range is between 25^o and 30^oC.
- c. Dissolved Oxygen : The lowest level should ordinarily be 4 mg/l.

Others

Site must be free from any source of pollution (industrial, agricultural, and domestic) and protected from environmental hazards such as typhoons, flood, erosion, etc. It must be accessible and preferably secured from poachers.

2. Pond Specification

- Pond size : Preferably 0.5-1.0 ha water area.
- Water depth : 0.8-1.0 m
- Water gate : Preferably separate supply and drainage gate; may be single.
- Dikes : Must be structurally strong and free from leaks.
- Canal/Trench : Single (diagonal or peripheral); 5-10 m wide and 0.50-0.75 m deep.
- Bottom : Must be levelled.
- Others : Install proper gate screens.

3. Life Support System

- Pump : May not be necessary; (10-18 cm centrifugal pump is preferable).
- Manpower : Personnel must have sufficient training or experience in pond culture techniques, preferably prawn culture.

4. Pond Preparation

- Draining** : Drain pond water completely and remove miscellaneous fish, other animals and weeds.
- Soil Sampling** : Collect soil samples for analyses of pH and organic matter.
- Pest & Predator Control** : Treat undrainable areas of pond with either (a) ammonium Sulfate (21-0-0) and quick lime (CaO) at 1:5 ratio at 0.1-0.5 kg/sq m; or (b) derris root containing 5% rotenone at 0.5-2.0 g/ton pond water (more effective at higher temperature during daytime and at lower pH); or (c) tea-seed cake at 12 g/ton for salinity lower than 15 ppt and 20-30 g/ton for salinity higher than 15 ppt.
- Conditioning of Pond Bottom** : Dry pond bottom until it cracks, then till the pond soil using a rotavator, plow blade or hoe. Control depth of till about 7.0 cm.
- Liming** : Apply lime at 1 ton/ha on the pond dikes and pond bottom. The quantity may vary from 200 kg/ha to 3 tons/ha depending on the soil pH.
- Fertilization** : a) Organic manure: about a week after liming, apply manure at 1 ton/ha.
b) Inorganic fertilizer: also apply synthetic fertilizers Ammonium Phosphate (16-20-0) and Urea (46-0-0) at 50 kg/ha each.
- Installing Screens** : Install fine mesh net (0.2 mm mesh size) at the gate(s) to prevent entrance of unwanted species and escape of fry stock.

- Flooding : Introduce water up to 5-10 cm deep into the pond. After a week, gradually increase water to the desired level. Check double screens to prevent entry of unwanted species.
- Installing Substrates/
Shelters : Spread coconut fronds throughout the pond bottom except in the trench. About 250-500 pcs/ha is required (1/20 m²).
- Planting some
Vegetation : You may plant aquatic plants *digman* and *kusay-kusay* in various part of the pond.
5. Acclimation and Stocking
- Assessing Plankton : Make preliminary assessment of plankton before stocking prawn fry, that is, about two weeks after fertilization of pond.
- Acclimating : Acclimating of fry before stocking is essential. Adjust the salinity and temperature of transport water to pond water before stocking.
- Size and Age of Fry
and Stocking : (a) PL₂₀ Size Fry: Stock the fry overnight inside hapa nets fixed in grow-out ponds before releasing them into the pond.
(b) PL₅₀ Size Fry: Stock the fry directly into the grow-out pond. Stock fry at least 2 weeks after fertilization and flooding.
- Stocking Rate : Try either of the two rates of stocking depending on the availability of fry: (a) 5,000 fry/ha, or (b) 7,500 fry/ha.

- Time of Stocking : Early morning or late afternoon. Do not stock when water temperature is high or beyond 30°C.
- Distribution of Fry : Release fry evenly around pond perimeter.

6. Water Management

- Tidal : Change 10-30% of the pond water every day for 2 to 4 days during highest tide. Maintain 0.80-1.0 m water level.
- Use of Pump : Use a pump to bring in new water when dissolved oxygen level is below 3.7 ppt or when you see the prawns surface and jumpy, or when salinity is higher (over 40 ppt); also, when water temperature is very high and there is abrupt reduction of water level due to leakage. In an emergency situation at spring tides, pump pond water out of the pond.
- Post-stocking Fertilization : Apply chicken manure at 100 kg/ha every two weeks after 1 month (total of 5 applications). This may be done after spring tide or water change (use T-bags). Suspend manure in sacks (20 kg/sack) at different sites in the pond.
- Others : Routinely check inlet-outlet screen installation; dikes for possible leakage and damage caused by burrowing animals.

7. Stock Sampling

- Frequency : Once a month.
- Sampling Procedure : Use a cast net (10 throws at different pond locations)

8. Feeding : There is no need to feed.

9. Monitoring Scheme

Physico-chemical Conditions	:	Monitor pH, dissolved oxygen, salinity and water temperature three times a week at 6:00-6:30 AM and 3:00-3:30 PM at two layers: 10 cm below surface and 10 cm from bottom at three pond locations. The best levels are (a) pH (7-8.5), (b) dissolved oxygen (4-8 ppm), (c) salinity (10-25 ppt), and (d) water temperature (25°C-30°C).
Biological Conditions	:	Assess plankton abundance every 2 weeks.

10. Harvesting

Partial Harvest	:	Start partial harvesting every spring tide when stock reaches average weight of 25 g and above.
Total Harvest	:	Total harvest is done after 4 months of culture.

11. Economics

PARTIAL DIRECT COST (PDC)* (per ha basis)

LIMING	1 ton		₱500.00
FERTILIZER			
Chicken manure	1.5 tons	₱	750.00
Ammonium phosphate	50 kg		225.00
Urea (46-0-0)	50 kg		250.00
Ammonium sulfate (21-0-0)	25 kg		70.00
			<u>₱1,295.00</u>

MISCELLANEOUS

Fine mesh screen (0.2 mm)	40 m	₱ 320.00	
Coconut fronds	500 pcs	250.00	
Ice	2 blocks	156.00	₱ 726.00

PARTIAL DIRECT COST ₱2,521.00

*Cost estimates based on 1985 prices

NOMINAL PROJECTIONS AND PARTIAL COSTS
AND RETURNS*

PARTICULAR/SCHEME

	A	B	C	D
Stocking size	PL 20	PL 20	PL 50	PL 50
Price	₱0.30/pc	₱0.30/pc	₱0.70/pc	₱0.70/pc
Stocking rate/ha	5,000	7,500	5,000	7,500
Culture period	4 mos.	4 mos.	4 mos.	4 mos.
Survival rate	65%	65%	70%	70%
Harvest size	30 pcs/kg	40 pcs/kg	25 pcs/kg	33 pcs/kg
Total harvest	108 kg	122 kg	140 kg	159 kg
Market price	₱140/kg	₱120/kg	₱160/kg	₱140/kg
Return/ha	₱15,120	₱14,460	₱22,400	₱22,260
Cost/ha				
Seed	1,500	2,250	3,500	5,250
PDC (see detail)	2,271	2,271	2,271	2,271
	₱ 3,771	₱ 4,521	₱ 5,771	₱ 7,521
Profit	₱11,349	₱10,104	₱16,629	₱14,739

*Cost estimates based on 1985 prices

Prawn Pond Culture

B. Extensive Prawn Culture System II

1. Site Specification

- Water Source :
- a. Brackishwater : Must be available in sufficient quantity the whole year round.
 - b.. Freshwater : A freshwater source is essential.
- Environmental Conditions
- a. Salinity : Sugpo grows best at the salinity range between 10 and 25 ppt.
 - b. Temperature : Best temperature range is between 25°C and 30°C.
 - c. Dissolved Oxygen : The minimum level should ordinarily be 4 mg/l.

Others

The site must be free from any source of pollution (industrial, agricultural and domestic) and, as much as possible, protected from environmental hazards such as typhoons, floods, erosion, etc. It must be accessible and preferably secured from poachers.

2. Pond Specification

- Pond Size : Preferably 0.5-1.0 ha water area.
- Water Depth : 0.8-1.0 m
- Water Gate : Separate supply and drainage gate; may be single.
- Dikes : Must be structurally strong and free from leaks
- Canals/Trench : Single (diagonal or peripheral), 5-10 m wide and 0.50-0.75 m deep.
- Bottom : Must be levelled.

- Others : Installation of proper gate screens is essential.
3. **Life Support System**
- Pump : Necessary (10-18 cm centrifugal pump) for emergency.
- Manpower : Personnel must have sufficient training or experience in pond culture, preferably prawn culture.
4. **Pond Preparation**
- Draining : Drain pond water completely and remove miscellaneous fish, other animals, and weeds present.
- Soil Sampling : Collect soil samples for analyses of pH and organic matter.
- Pest & Predator Control : Treat undrainable areas of pond with either (a) Ammonium Sulphate (21-0-0) and quick lime (CaO) at 1:5 ratio at 0.1-0.5 kg/sq m; or (b) derris root containing 5% rotenone at 0.5-2.0 g/ton pond water – more effective at higher temperature during day time and at lower pH; or (c) teaseed cake at 12 g/ton for salinity lower than 15 ppt and 20-30 g/ton for salinity higher than 15 ppt.
- Conditioning of Pond Bottom : Dry pond bottom until it cracks after which tilling is done using a rotavator, plow blade or hoe. Control depth of till to about 7.0 cm.
- Liming : Apply lime at 1 ton/ha to the pond dikes and pond bottom. The quantity may vary from 200 kg/ha to 3 tons/ha depending on the soil pH.

- Fertilization : a) Organic manure: About a week after liming apply chicken manure at 1 ton/ha.
- b) Inorganic fertilizer: Apply synthetic fertilizers, Ammonium Phosphate (16-20-0) and Urea (46-0-0) at 50 kg/ha each.
- Installation of Screens : Install fine mesh net (0.2 mm mesh size) at the gate(s) to prevent entrance of unwanted species and escape of stocked fry.
- Flooding : At first introduce 5-10 cm deep water into the pond and then gradually raise water level to the desired level after a week. Check double screens to prevent entry of unwanted species into the pond.
- Installation of Substrates/Shelters : Distribute coconut fronds throughout the pond bottom except in the trench. About 250 to 500 pcs/ha is required (1/20 m²). Twigs may also be used.
- Planting some Vegetation : You may plant aquatic plants *digman* and *kusay-kusay* in certain areas of the pond.

5. Acclimation and Stocking

- Assessment of Plankton : Make preliminary assessment of plankton before stocking prawn fry, that is, about two weeks after fertilization of pond.
- Acclimation : Acclimation of fry prior to stocking is essential. Adjust the salinity and temperature of transport water and pond water before stocking.

- Size/Age of Fry and Stocking : (a) PL₂₀ Size Fry: Stock these fry overnight inside hapa nets fixed in grow-out ponds before releasing into the pond.
- (b) PL₅₀ Size Fry: Stock these fry directly into the grow-out pond. Stock fry at least 2 weeks after fertilization and flooding.
- Stocking Rate : 10,000/ha
- Time of Stocking : Early morning or late afternoon. Avoid stocking when water temperature is high.
- Distribution of Fry in the Pond : Release fry evenly around pond perimeter.

6. Water Management

- Tidal : Change 10-30% of the pond water every day for 2 to 4 days during highest tide. Maintain 0.80-1.0 m water level.
- Use of Pump : Use a pump to introduce new water when dissolved oxygen level is low below 3.7 ppt or when you see prawns surface and jumpy, or salinity is higher (over 40 ppt). Also, when water temperature is very high or there is abrupt reduction of water level due to leakage.
- Post-stocking Fertilization : Apply chicken manure at 100 kg/ha every 2 weeks from 1 month (total 5 applications). Application may be made after spring tide or water change (use T-bags). Suspend manure in sacks 20 kg/sack at different sites in ponds.
- Others : Routine check of inlet-outlet screen installation; routine check of dikes for possible leakages and damages which may be caused by burrowing animals.

7. Stock Sampling

- Frequency : Once a month.
- Sampling Procedure : Use cast net (10 throws at different pond locations).

8. Feeding

- Type of Feed : Formulated pelletized feed with about 40% protein content or chopped trash fish.
- Feeding Rate : A sliding scale may be used where an 8, 6, 4, 2% of total body weight feed is carried out every 2 weeks; a 6% total body weight feed computation may also be used (straight up to harvest time).

9. Monitoring Scheme

- Physico-Chemical Parameters : Monitor pH, dissolved oxygen, salinity and water temperature three times a week at 6:00-6:30 A.M. and 3:00-3:30 P.M. at two layers, 10 cm below surface, and 10 cm from bottom at three pond locations. Optimum levels are:

- a) pH (7-8.5)
- b) dissolved oxygen (4-8 ppm)
- c) salinity (10-25 ppt)
- d) water temperature (25^o-30^oC)

- Biological Parameters : Assess plankton abundance every 2 weeks.

10. Harvesting

- Partial harvest : Start partial harvesting every spring tide when stock reaches 25 g and above.

Total harvest : Total harvest is done after 4 months of culture.

11. Economics

PARTIAL DIRECT COST (PDC)* (per ha basis)

LIMING 1 ton P 500.00

FERTILIZER

Chicken manure	1 ton	P 750.00	
Ammonium phosphate (16-20-0)	50 kg	225.00	
Urea (46-0-0)	50 kg	250.00	
Ammonium sulfate (21-0-0)	25 kg	70.00	P1,295.00

MISCELLANEOUS

Fine mesh screen (0.2 mm)	40 m	P 320.00	
Coconut fronds	500 pcs	250.00	
Ice	2 blocks	156.00	P 726.00

PARTIAL DIRECT COST P2,521.00

*Cost estimates based on 1985 prices.

NOMINAL PROJECTIONS AND PARTIAL COSTS AND RETURNS*

PARTICULARS/SCHEME

Stocking Size	PL 20	PL 50	PL 20
Price/piece	P0.30	P0.70	P0.30
Stocking rate/ha	10,000	10,000	15,000
Culture Period	4 months	4 months	4 months
Prawn Pond Culture			

Survival Rate	65%	70%	65%
Harvest Size	30 pcs/kg	30 pcs/kg	30 pcs/kg
Total Harvest	217 kg	233 kg	273 kg
Feed (FCR = 2)**	174 kg	116 kg	261 kg
Market Price	₱120/kg	₱140/kg	₱120/kg
Revenues/ha	₱26,040	₱32,620	₱32,760
Cost/ha			
Seed	₱ 3,000	₱ 7,000	₱ 4,500
Feeds (at P20/kg)	3,480	2,320	5,220
PDC	2,521	2,521	2,521
	<u>₱ 9,001</u>	<u>₱11,841</u>	<u>₱12,241</u>
Profit	<u>₱17,039</u>	<u>₱20,779</u>	<u>₱20,519</u>

*Cost estimates based on 1985 prices.

**Based on the amount of supplementary feed given.

C. Semi-intensive Prawn Culture System

1. Site Specification

Water Source

- a. Brackishwater : Must be sufficient the whole year round.
- b. Freshwater : Freshwater source is also essential.

Optimum Environmental Conditions:

- a. Salinity : Sugpo grows best at a salinity range between 10-25 ppt.
- b. Temperature : Optimum temperature range is between 25°C-30°C.
- c. Dissolved oxygen : The minimum level should ordinarily be 4 mg/l.
- Others : The site must be free from any source of pollution (industrial agricultural and domestic) and, as much as possible, protected from environmental hazards such as typhoons, floods, erosion, etc. It must be accessible and preferably secured from poachers.

2. Pond Specification

- Pond Size : Preferably 0.5-1.0 ha water area.
- Water Depth : 0.8-1.0 m
- Water Gate : Separate supply and drainage gate.
- Dikes : Must be structurally strong and free from leaks.
- Canal/Trench : Single (diagonal or peripheral), 5-10 m wide and 0.50-0.75 m deep.
- Bottom : Must be levelled.
- Others : Installation of proper gate screens is essential.

3. Life Support System

- Pump : Necessary (10-18 cm centrifugal pump).
- Manpower : Personnel must have sufficient training or experience in pond culture, preferably prawn culture.

4. Pond Preparation

- Draining : Drain pond water completely and remove miscellaneous fish, other animals and weeds present.
- Soil Sampling : Collect soil samples for analyses of pH and organic matter.
- Pest & Predator Control : Treat undrainable areas of pond with either a) ammonium sulfate (21-0-0) and quick lime (CaC) at 1:5 ratio at 0.1-0.5 kg/sq m or b) derris root containing 5% rotenone at 0.5-2.0 g/ton pond water – more effective at higher temperature during day time and at lower pH; or c) teaseed cake at 12 g/ton for salinity lower than 15 ppt and 20-30 g/ton for salinity higher than 15 ppt.
- Conditioning of Pond Bottom : Dry pond bottom until it cracks after which tilling is done using a rotavator, plow blade or hoe. Control depth of till to about 7.0 cm.
- Liming : Apply lime at 1 ton/ha to the pond dikes and pond bottom. The quantity may vary from 200 kg/ha to 3 tons/ha depending on the soil pH.
- Fertilization : a) *Organic manure*: About a week after liming apply chicken manure at 1 ton/ha.
 b) *Inorganic fertilizer*: Apply synthetic fertilizers, Ammonium phosphate (16-20-0) and Urea (46-0-0) at 75 and 25 kg/ha respectively.

Installation of Screens : Install fine mesh net (0.2 mm mesh size) at the gate to prevent entrance of unwanted species and escape of stocked fry.

Flooding : At first introduce 5-10 cm deep water into the pond and then gradually raise water level to the desired level after a week. Check double screens to prevent entry of unwanted species into the pond.

Installation of Substrates/Shelters : Distribute coconut fronds throughout the pond bottom except in the trench. About 250 to 500 pcs/ha is required (1/20 m²). Twigs may also be used.

Plantation of Some Vegetation : You may plant aquatic plants like *digman* and *kusay-kusay* in certain areas of the pond.

5. Acclimation and Stocking

Assessment of Plankton : Make preliminary assessment of plankton before stocking prawn fry, that is, about two weeks after fertilization of pond.

Acclimation : Acclimation of fry prior to stocking is essential. Adjust the salinity and temperature of transport water and pond water before stocking.

Size/Age of Fry and Stocking : PL₂₀ Size Fry: Stock these fry overnight inside hapa nets fixed in grow-out ponds before releasing into the pond.

PL₂₅₋₃₀ Size Fry: (If available) stock these fry directly into the grow-out pond. Stock fry at least 2 weeks after fertilization and flooding.

- Stocking Rate : 15,000-25,000/ha.
- Time of Stocking : Early morning or late afternoon. Avoid stocking when water temperature is high.
- Distribution of Fry in the Pond : Release fry evenly around pond perimeter.

6. Water Management

- Tidal : Change 10-30% of the pond water every day for 2 to 4 days during highest tide. Maintain 0.8-1.0 m water level.
- Use of Pump : Use a pump for introduction of new water when dissolved oxygen level is below 3.7 ppt or salinity is higher (over 25 ppt). Also when water temperature is very high and there is abrupt reduction of water level due to leakages. When pond water is about to overflow during spring tide, pump water out.
- Post-stocking Fertilization : Apply chicken manure at 100 kg/ha every 2 weeks from one month (total 5 applications). Application may be made after spring tide or water change (use T-bags).
- Others : Routine check of inlet-outlet screen installation; routine check of dikes for possible leakages and damages which may be caused by burrowing animals.

7. Stock Sampling

Frequency : Twice a month or every 15 days.

Sampling Procedure : Use cast net (10 throws at different pond locations) henceforth.

8. Feeding

No feeding is done for the first 30 to 45 days depending on natural productivity of the pond. Feeding is carried out from the 46th day after stocking until harvest.

Type of Feed : Mainly formulated pelletized feed (about 75% of total requirement) with about 30-40% protein content and about 25% of chopped trash fish.

Feeding Rate : A sliding scale may be used where 6, 5, 4, 3% of total body weight feed is carried out every month; a 4.5 total body weight feed computation may also be used (straight up to harvest time).

9. Monitoring Scheme

Physico-chemical Parameters : Monitor pH, dissolved oxygen, salinity, transparency and water temperature three times a week at 6:00-6:30 AM and 3:00-3:40 PM at two layers, 10 cm below surface, and 10 cm from bottom at three pond locations. Optimum levels are:

- a. pH (7-8.5)
- b. dissolved oxygen (4-8 pp)
- c. salinity (10-15 ppt)
- d. transparency (25-50 cm)
- e. water temperature (25⁰-30⁰C)

Biological Parameters : Assess plankton abundance every 2 weeks. Excess or decayed plankton should be scooped out.

10. Harvesting

Partial Harvest	:	Start partial harvesting every spring tide when stock reaches 25 g and above.
Total Harvest	:	Total harvest is done after 4 months of culture.

11. Economics

PARTIAL DIRECT COST (PDC)*
Per ha Basis

Pond Conditioning

Liming	1 ton	500.00
Ammonium sulfate	25 kg	<u>70.00</u>

P 570.00

Fertilizer

Chicken manure	1.5 ton	750.00
Ammonium phosphate (16-20-0)	75 kg	337.50
Urea (46-0-0)	25 kg	<u>125.00</u>

P 1,212.50

Miscellaneous

Fine mesh screen (0.2 mm)	70 m	320.00
Coconut fronds	500 pcs	250.00
Ice	3 blks.	<u>234.00</u>

P 804.00

Partial Direct Cost

P 2,586.50

*Cost Estimates based on 1986 prices.

**NOMINAL PROJECTIONS AND PARTIAL COSTS AND RETURNS
AT STOCKING DENSITY OF 15,000/ha AND CULTURE PERIOD OF 120 DAYS**

Scheme	A	B	C
Stocking density/size	15,000 (PL ₂₀)	15,000 (PL ₂₅)	15,000 (PL ₃₀)
Survival rate (%)	70	73	75
Pcs. harvested	10,500	10,950	11,250
No. of pcs/kg	32	30	28
Total harvest (kg)	330	365	400
Market price/kg	₱115	₱130	₱130
Revenue/ha	₱37,950	₱47,450	₱52,000
Cost/ha			
A. Seed Cost			
Pcs/stage	15,000 (PL ₂₀)	15,000 (PL ₂₅)	15,000 (PL ₃₀)
Price/pc	₱0.30	₱0.35	₱0.40
Cost	₱4,500	₱5,250	₱6,000
B. Feed Cost			
*Total Feed Requirement (kg)	653	740	828
Price/kg	₱20	₱20	₱20
Cost	₱3,060	₱14,800	₱16,560
C. PDC	₱2,586.50	₱2,586.50	₱2,586.50
Cost/ha	₱20,146.50	₱22,636.50	₱25,146.50
Gross income	<u>₱17,803.50</u>	<u>₱24,813.50</u>	<u>₱26,853.50</u>

*Total Est. Feed Requirement (TEFR) = FCR x Est. wt. gained
 Where: Est. wt. gained = Tot. harvest wt. - Est. wt. at day 45
 FCR = 2.5
 Est. wt. at day 45 = 69 kgs

**NOMINAL PROJECTIONS AND PARTIAL COSTS AND RETURNS
AT STOCKING DENSITY OF 20,000/ha AND CULTURE PERIOD OF 120 DAYS**

Scheme			
Stocking density/size	20,000 (PL ₂₀)	20,000 (PL ₂₅)	20,000 (PL ₃₀)
Survival rate (%)	70	73	75
Pieces harvested	14,000	14,600	15,000
Harvest size: Pcs/kg	34	32	30
Total harvest wt. (kg)	412	456	500
Market Price/kg	₱115	₱115	₱130
Revenue/ha	<u>₱47,380</u>	<u>₱52,440</u>	<u>₱65,000</u>
Cost/ha			
A. Seed Cost			
Pieces (stage)	20,000 (PL ₂₀)	20,000 (PL ₂₅)	20,000 (PL ₃₀)
Price/pc	₱0.30	₱0.35	₱0.40
Cost	₱5,000	₱7,000	₱8,000
B. Feed Cost			
*Total Est. Feed			
Reqr't. (kg)	800	910	1,020
Price/kg	₱20	₱20	₱20
Cost	₱16,000	₱18,200	₱20,400
C. PDC			
Cost/ha	₱2,586.50	₱2,586.50	₱2,586.50
Gross income	<u>₱22,793.50</u>	<u>₱24,653.50</u>	<u>₱34,013.50</u>

*Total Est. Feed Requirement (TEFR) = FCR x Est. wt. gained
 Where: Est. wt. gained = Tot. harvest wt. - Est. wt. at day 45
 FCR = 2.5
 Est. wt. at day 45 = 92 kgs.

**NOMINAL PROJECTIONS AND PARTIAL COSTS AND RETURNS
AT STOCKING DENSITY OF 25,000/ha AND CULTURE PERIOD OF 120 DAYS**

Scheme	A	B	C
Stocking density/size	25,000 (PL ₂₀)	25,000 (PL ₂₅)	25,000 (PL ₃₀)
Survival rate (%)	70	73	75
Pieces harvested	17,500	18,250	18,750
Harvest size (pcs/kg)	36	34	32
Total harvest wt. (kg)	486	537	586
Market (Price/kg)	₱115	₱115	₱115
Revenue/ha	₱55,890	₱61,755	₱67,390
Cost/ha			
A. Seed Cost			
Pieces (stage)	25,000 (PL ₂₀)	25,000 (PL ₂₅)	25,000 (PL ₃₀)
Price/pc	₱0.30	₱0.35	₱0.40
Cost	₱7,500	₱8,750	₱10,000
B. Feed Cost			
*Tot. Est. Feed			
Reqr't. (kg)	928	1,055	1,178
Price/kg	₱20	₱20	₱20
Cost	₱18,560	₱21,100	₱23,560
C. PDC			
Cost/ha	₱2,586.50	₱2,586.50	₱2,586.50
Gross Income	₱27,243	₱29,318	₱31,243

Total Est. Feed Requirement (TEFR) = FCR x Est. wt. gained

Where: Est. wt. gained = Total harvest wt -- Est. wt. at day 45

FCR = 2.5

Est. wt. at day 45 = 115 kgs



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- *Broodstock of Sugpo (Penaeus monodon Fabricius)*. J.H. Primavera. AEM No. 7, 4th ed. 1989. 23 pp. ISSN 0115-5369. Domestic P80, foreign US \$28.
- *Prawn Hatchery Design and Operation*. Working Committee on Prawn Hatchery. AEM NO. 9, 2nd ed. 1984, 4th printing 1989. 47 pp. ISSN 0115-5369. Domestic P80, foreign US \$31.
- *Important Fish and Shrimp Fry in Philippine Coastal Waters: Identification, Collection and Handling*. T.U. Bagarinao, N.B. Solis, W.R. Villaver & A.C. Villaluz. AEM No. 10, 1986. 52 pp. ISSN 0115-5369. Domestic P80, foreign US \$31.

AQUACULTURE EXTENSION PAMPHLETS (AEP)

- *Recent Developments in Prawn Pond Culture*. F.D. Apud, AEP No. 1, 1989. 23 pp. Domestic P30, foreign US \$28.
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POSTERS

- *Important Penaeid Prawns/Shrimps of the Philippines*. Poster No. 1 (colored), 2nd printing 1987. Domestic P50, foreign US \$31.
- *Life Cycle of Prawn*. Poster No. 2 (colored), revised 1989. Domestic P50, foreign US \$31.

PROCEEDINGS

- *Advances in Milkfish Biology and Culture*. Second International Milkfish Aquaculture Conference, Iloilo City, Philippines, October 1983. 243 pp. Domestic P230, foreign US \$45.
- *Proceedings of the First International Conference on the Culture of Penaeid Prawns/Shrimps*. Y. Taki, J.H. Primavera & J.A. Llobrera, Eds. 1985. 197 pp. ISBN 971-8511-00-8. Domestic P350, foreign US \$60.

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AQUACULTURE EXTENSION PAMPHLET No. 1
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SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER
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