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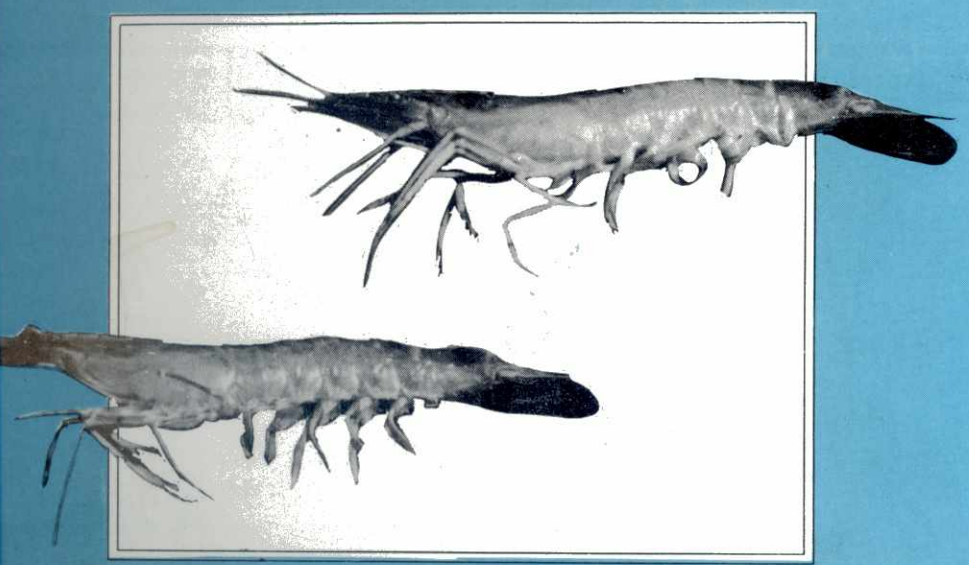

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# Technology Demonstration on the Semi-Intensive Culture of *Penaeus Monodon* in Brackishwater Pond

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## ABSTRACT

**A technology demonstration of the semi-intensive culture of the prawn (*Penaeus monodon*), was conducted at the BFAR National Brackishwater Aquaculture Technology Research Center, Pagbilao, Quezon, from December 1986 to November 1989. An earthen pond with an area of 7,000 sq. m was used. It was stocked with hacthery-bred prawn fry ($PL_{18}$-$PL_{20}$) at increasing rates of 42,800/ha; 61,700/ha; 62,300/ha and 68,600/ha in four successive cropping periods. The prawns were cultured for an average of 138 days and fed with commercial pellets. Their production, growth rate, survival rate, net income and return on investment (ROI) were analyzed and compared.**

**Growth rate of prawns at the lowest stocking rate (42,800/ha) was the highest at 0.41 g/day. However, production was lowest at this stocking rate. Survival rate varied from 38% to 93 %. Profit was highest on the third crop which obtained the highest survival rate.**

**Keywords:** prawn, Penaeus monodon, semi-intensive culture, production, growth rate, survival rate, net income

## INTRODUCTION

The semi-intensive culture technology demonstration of *Penaeus monodon* conducted at the BFAR National Brackishwater Technology Research Center (NBATRC), Pagbilao, Quezon, was a cooperative undertaking between the *Kilusang Sariling Sikap-Pagkain ng Bayan* (KSS-PngB) and the Bureau of Fisheries and Aquatic Resources (BFAR). It was embodied in a Memorandum of

Agreement signed by the two parties in October 1986. The project was implemented from December 1986 to November 1989. With this agreement, the BFAR made available the use of an approximately 7,000 sq m fishpond compartment at the NBATRC, Pagbilao, and provided the technical manpower. On the other hand, the KSS-PngB provided for the operational cost. All proceeds from the project were remitted to the Technology and Livelihood Resource Center (TLRC), the mother agency of KSS-PngB.

The main purpose of this report is to give a general account of the practices involved during the operation as well as the economics of the culture system.

## METHODOLOGY

### Pond Preparation

A 7,000 sq m earthen pond was used in the project. Before stocking the prawn fry, the pond was prepared, following the pond preparation technique used at Pagbilao Center.

The pond was drained, cleared of debris and sundried until the bottom cracked. Ammonium sulfate fertilizer (21-0-0) and hydrated lime (five bags/ha) were applied to kill unwanted fish species. One bottle of aquatin was applied once a year to kill snails and small crabs in the pond. Further conditioning of the pond soil was done by applying 1,000 kg of hydrated lime. The pond was filled with water to a depth of 80-100 cm, and allowed to grow plankton for several days prior to stocking. The pond prepation process took 30 to 45 days.

### Stocking

Prawn fry ranging from $PL_{18}$ to $PL_{20}$ were used. All the fry used came from the hatchery. Upon arrival at the site, the fry in plastic bags were poured into a wide-mouthed white basin, using portable air pumps. Salinity and temperature readings of the pond and transport water were taken to check whether or not there was a need for acclimatization.

Head counting of fry was done by sampling three bags per five bags delivered, and the total fry estimate was computed by using the following formula:

$$\text{Total fry estimate} = \frac{\text{Total fry count}}{\text{No. of bags sampled}} \times \text{Total no. of bags}$$

The fry were stocked early in the morning between 6:00 to 7:00 am. at increasing rates of 42,800/ha; 61,700/ha; 62,300/ha; and 68,000/ha in four successive cropping periods.





### Rearing and Care of Stock

#### *Feeding*

The prawns were fed one week after stocking, following the feeding schedule shown in Table 1. Commercial feeds were used and different types were given in different growing stages. The feeds were broadcast evenly throughout the pond and feeding trays were used as indicators for feed consumption.

#### *Stocking Sampling*

The first stock sampling was done after 45 days of culture and every 15 days thereafter. Sample size consisted of at least 100 pieces and the animals were weighed individually. During the early stages, the prawns were sampled from the feeding trays; when they reached about 10 g, sampling was done with the use of the cast net. After sampling, they were returned to the pond.

Average body weight (ABW) was computed, using the following formula:

$$\text{ABW} = \frac{\text{Total weight (g)}}{\text{Number of samples}}$$

#### *Water Management*

Water exchange was done every 15 days during spring tides. To effect good water change, fresh tidal water was introduced into the pond through an inlet gate and drained into an outlet culvert situated at the opposite end of the pond. Water level was maintained at 80-100 cmusing 1.5 hp electric pump (pasipa). The pump was operated daily during neap tides. To minimize water loss during neap tides, control gates were soil-sealed after the last spring tide which occured every 15 days. Water salinity was recorded daily.

#### *Control of Pest and Predators*

Bamboo screens were installed at the control gates to prevent the entrance of unwanted species that may adversely affect the growth and survival of prawns. The bamboo screen which served as the primary screen was installed at the mouth of the gate. Another screen (bulon) made of 1.0 mm mesh nylon net enclosed the gate opening at the pond side. It was formed into a half circle, 3.0 m in diameter, with a height of 2.0 m, to serve as secondary line of defense in case unwanted species penetrated the bamboo screen. Teaseed powder was applied

after 60 days of culture to kill finfishes that may have gained entry into or grown in the pond.The powder, with a ratio of 50 kg/ha, was soaked in water, allowed to stand overnight and then poured into the pond. Fifty percent of pond water was drained before the poison was applied. Then the pond was refilled with water after about five hours when the poison had taken effect.

### *Harvest*

The prawns were harvested when they reached marketable size of 25-30 pcs/kg. The pond was totally drained and a bagnet was attached to the drain gate to catch the prawns coming out with the water. The prawns left in the pond after draining were handpicked. They were immediately washed and chilled. The chilled prawns were later sorted according to size and quality. After sorting, good quality prawns were packed in ice for transport/sale. Soft-shelled, bluish, under-sized, diseased prawns and those with deformed shells were classified as rejects. They were valued at 75% of the price of good quality prawns.

## RESULTS AND DISCUSSION

Table 2 shows the result of production for the four cropping periods. Stocking rate ranged from 42,800/ha to 68,600/ha, or an average of 6 pcs/m2. Culture period ranged from 131 to 144 days, or an average of 138 days. Production which was directly affected by the survival rate was highest in Crop 3 and lowest in Crop 1 (Fig. 1).

Survival rates varied among the four crops. A survival rate of 38% was obtained during the first cropping. It is important to note that aside from being the first crop, this was also the first time that the pond was used for culture.

The second and third crops showed very good survival rates. But then it dropped again in the fourth crop due to disease contanimation and pouching. Bad weather and frequent brownouts minimized water exchange when needed.

The feed conversation ratio increased with the increase stocking density and culture period.

Table 3 shows the stock sampling data taken at 15-day intervals. The average body weight (ABW) was plotted against the schedule of sampling to get the growth curve (Fig. 2). The graph shows that the animals in the low-density culture grew faster than those of the other three.

Table 4 indicates the financial statement. All the four crops gained profit. The highest profit, was obtained in the third crop which had the highest survival





rate. The profit obtained from the culture operations depended on the volume of production and the prevailing price of the commodity at the time of harvest.

## CONCLUSION

The semi-intensive prawn culture project of the BFAR-PngB was financially viable. The return on investment (ROI) indicated that the project was profitable although the capital investment was relatively high. The prevailing price at harvest and the survival rate were the most significant factors which contributed to its profitability.

The project was successful because the main objective, which was to gain profit out of the technology demonstration, was achieved. It also became a show window for prawn culture technology adaptable for medium-scale operation. Futhermore, the project served as a training for the center's technical staff and on-the-job trainees. The incentives provided by the TLRC/PngB to the project personnel boosted their morale toward the success of the project.

The success of the project depended partly on the wholehearted support provided by the PngB management and staff. It allowed a cash advance to take care of emergency purchases. Requisition of inputs was facilitated by concerned officials so that prompt payment was made to the supplier upon delivery of the goods. Existing pond facilities were improved and additional equipment were acquired through the funding assistance provided by TRLC/PngB to the project.

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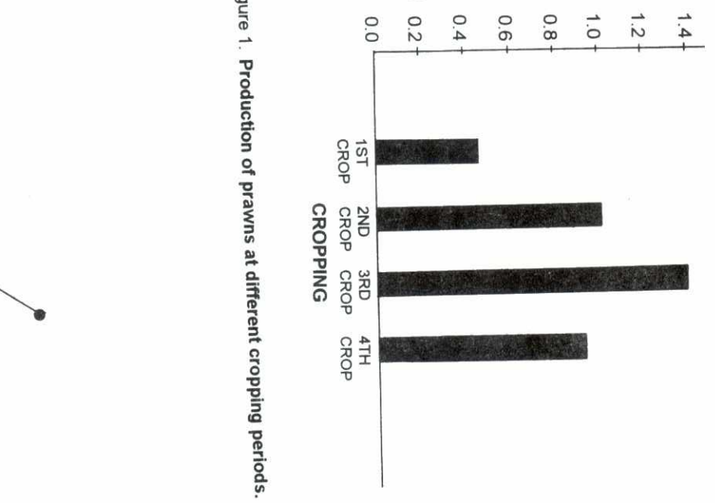


Figure 1. **Production of prawns at different cropping periods.**

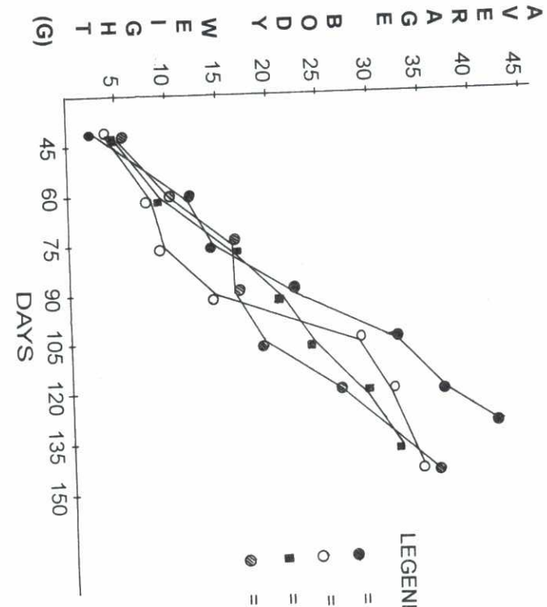


Figure 2. **Growth rate of prawns at different cropping periods.**

Table 1. **Feeding schedule.**

| Feed Type | Growing Stage (g) | Feeding Rate(% Body wt.) | Frequency of Feeding/Day | Time |
|---|---|---|---|---|
| Starter | 0.1 - 4.0 | 5 - 6 | 2 | 7:00 AM/5:00 PM |
| Grower | 4.0 - 10.0 | 4 | 3 | 7:00 AM/12:00 noon /5:00 PM |
| Finisher | 10.0 - 20.0 | 3 | 4 | 7:00AM/12:00 noon/ 5:00PM/10:00PM |
| Finisher | 20.0 - above | 2 | 4 | - do - |

Table 2. **Comparative result of production of P. monodon at different croppings.**

| Particulars | Crop 1 | Crop 2 | Crop 3 | Crop 4 |
|---|---|---|---|---|
| Date stocked | Dec. 15, 1986 | June 09, 1987 | Nov. 27, 1987 | July 05,1988 |
| Date harvested | April 25, 1987 | Oct. 24, 1987 | April 16, 1988 | Nov. 26, 1988 |
| Culture period (days) | 131 | 137 | 140 | 144 |
| Stocking density (pcs) | 30,000 | 43,200 | 43,600 | 48,000 |
| Stocking rate (pcs/ha) | 42,800 | 61,700 | 62,300 | 68,600 |
| Volume harvested (kg) | 450.7 | 1,019 | 1,385.5 | 925 |
| Average body weight (g) | 40.18 | 31.6 | 34.3 | 35.9 |
| No. of pcs/kg | 25 | 31.6 | 29 | 27.8 |
| Estimated No. of pc harvested | 11,268 | 34,636 | 40,394 | 25,766 |
| Survival rate (%) | 38% | 80% | 93% | 54% |
| Total feeds consumed (kg) | 651.3 | 1,580 | 2,653 | 1,889 |
| Feed Conversation Ratio (FCR) | 1.4 | 1.6 | 1.9 | 2.0 |

Table 3. **Average growth rate of P. monodon at different croppings.**

| Frequency of Sampling (days) | Average Body Weight (g) Crop 1 | Crop 2 | Crop 3 | Crop 4 |
|---|---|---|---|---|
| 45 | 4.7 | 5.0. | 5.19 | 5.6 |
| 60 | 11.12 | 8.26 | 9.13 | 10.3 |
| 75 | 14.58 | 9.2 | 15.34 | 16.1 |
| 90 | 23.41 | 14.7 | 20.56 | 16.75. |
| 105 | 32.23 | 28.38 | 24,46 | 19.64 |
| 120 | 36.82 | 31.6 | 28.96 | 26.9 |
| 135 | - | 32.72 | 32.07 | 32.46 |
| ABW at Harvest | 40.18 | 34 | 34.3 | 35.9 |
| Growth Rate/Day | 0.41 | 0.31 | 0.30 | 0.31 |

Table 4. **Comparative financial analysis of prawn culture opeation covering four cropping periods.**

| Croppings | I | II | III | IV |
|---|---|---|---|---|
| Gross Sales | P59,011.00 | P132,265.00 | P182,887.00 | P131,889.00 |
| **Operational Cost** | | | | |
| Cost of Fry (Sugpo) | 13,500.00 | 19,482.00 | 20,700.00 | 21,885.00 |
| Cost of Feeds | 14,500.00 | 45,030.00 | 61,834.00 | 67.585.00 |
| Cost of Lime/Fertilizer/ Pesticide | 2,755.00 | 2,595.00 | 3,125.00 | 4,035.00 |
| Cost of Gas/Power | 4,000.00 | 3,356.00 | 6,462.00 | 1,540.00 |
| Cost of Labor | 4,000.00 | 8,000.00 | 11,800.00 | 16,000.00 |
| Miscellaneous | 2,000.00 | 10,249.00 | 100.00 | 1,450.00 |
| **TOTAL** | 40,755.00 | 88,712.00 | 104,021.00 | 112,495.00 |
| Net Income | 18,256.00 | 43,553.00 | 78,866.00 | 19,394.00 |
| Stocking density | 30,000.00 | 43,200.00 | 43,602.00 | 48,000.00 |
| Culture period (no. of days) | 131.00 | 137.00 | 140.00 | 144.00 |
| Survival Rate | 38% | 80% | 90% | 53% |
| Feed Conversion Ratio (FCR) | 1.4 | 1.6 | 1.9 | 2.0 |
| Average size (pc/kg) | 25 | 30.7 | 29 | 27.8 |
| Average selling Price (P) | 150.00 | 110.00 | 143.00 | 132.42 |
| Total Fixed Cost (P) | 20,255.00 | 30,077.00 | 35.625.00 | 41,620.00 |
| Total Variable Cost (P) | 20,500.00 | 58,815.00 | 69,296.00 | 60,575.00 |
| Return on Investment (ROI) | 44.79% | 48.79% | 75.81% | 25.05% |
| Break-even point selling price/kg (BEPSP) (P) | 99.00 | 87.23 | 92.40 | 110.42 |
| Break-even Point sales volume in kg (BEPSV) | 298.92 | 575.30 | 433.55 | 621.47 |

Note:

BEPSV = Total Fixed Cost / (Unit Selling Price-Unit Variable Cost)

BEPSV = Find Cost and Variable Cost / No. of kg Produced