

## References

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## Supplementary Part I

### A Case study of Mr. Prasorp in carnivorous fish rearing

Mr. Prasorp has started raising Cross-breed catfish in 1983 within 2 ponds in an area of 0.35 rai each. His final goal is to increased income. But, there are three main reasons behind his decision. First, because he recognizes that less quantity and quality (size is too small) of fish catch from Thale Noi has to be substituted by those from raising. Second, he experienced from his friend who has been successful in Cross-breed catfish raising in Nakorn Si Thammaraj Province Next to North of Patthalung. Third, catfish is very popular among consumers so that it can be sold at a good price.

Presently, he has 3 ponds, the third one was dig in 1989 in an area of .875 rai for various herbivorous fishes, such as nile tilapia, local carp, and common carp for household consumption and mainly to spare water for catfish.

At early stage, he faced with many problems including lack of seed and mismanagement. He was fail in the early crops, but he tried again and again and thus, becoming better in the following crops. Therefore, he can continue raising fish until now. Costs and returns from 1990 catfish raising is shown in Table S1.

Table S1 Farm Budget of Cross-breed catfish raising in an area of 1,120 sq. metre's pond in a period of 4 month in 1990 :  
A Case Study of Mr.Prasorp.

Item	Value (baht)
<b>1. Income</b>	<b>82,200</b>
- Quantity of fish catch (kg)	2,740
- Selling price (baht/kg)	30
<b>2. Fixed Costs:</b>	
- Depreciation - pond	2,500
- Depreciation - feed grinder	340
- Depreciation - pump	750
- Depreciation - fishing gears	100
- Tax	3.5
- Interest on fixed costs (12.5%)	803.33
<b>Total Fixed Costs</b>	<b>4,496.83</b>
<b>3. Variable Costs:</b>	
- Seed (baht)	10,100
- 10,000 head	6,500*
- 18,000	3,600**
- Feed***	21,000
- Electricity	320

\* bought from private nursery, 0.60 baht each

\*\* Bought from Fishery Station, Fishery Department, 0.20 baht each

\*\*\*feed included those from chicken residue above the pond.

As break-even price is only 15.56 baht, as far as the price obtained is ranging from 25 to 35 baht a kg., farmers will be profitable in raising Cross-breed catfish. It can also be said that the lowest price of catfish to maintain the security of the enterprise is 15.56 baht if less than that, the decision to culture catfish should be reviewed.

## Supplementary Part II

### A Case study of Mr.Serm: one of project participant

Mr.Serm started raising fish before joining fish culture extension program with 2 ponds in an area of 600 sq.metre. Both herbivorous and carnivorous are reared. Fish rearing is for supplementary income. The project began to provide seed and feed in late April, 1989. The amount of nile provided was 200 heads. Feed is also provided according to the weight of nile which is of 5 kg. at the beginning and around 10 kg. as nile is bigger. He started harvesting in August. In early October, the project stopped supporting feed. Mr.Serm's record on the sale of young nile and mature nile is shown in appendix.

Table S2 shows costs and returns obtained by Mr.Serm from August, 1989 to September, 1990. The return from the sale of young nile and mature nile is roughly 8,410 baht. Fifty six percent of this is from the sale of young nile. Young nile can be sold at various price according to its size, from 0.50 to 1.43 baht each (see appendix). Total cost which includes fixed and variable cost is approximately 8,832 baht. The most significant variable cost is for feed, labor, and seed which is accounted for 4,841, 2,391 and 800 baht respectively. It can be seen that the profit is minus 422 baht. However, if family labor cost is excluded and the product for household consumption is included, the positive net return will exist. It is also important to point out here that the cost of feed will be lower if it is prepared by the farmers themselves.

Table S2 Costs and Returns from rearing Nile tilapia between August, 1989 and September, 1990 : A Case Study of Mr. Serm.

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Items	Value (baht)
<b>Total Return***</b>	<b>8,410</b>
- The sell of mature Nile	3,720
- The sell of young Nile (11,130 head)	4,690
<b>Total Cost</b>	<b>8,832</b>
Total Fixed Cost	800
- Depreciation - pond	750
- Depreciation - fishing gears	50
Total Variable cost	8,032
- seed*	800
- feed**	4,841
- labor (work .5 hr.daily)	2,391
<b>Estimated Profit</b>	<b>-422</b>

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\* seed provided by the project in late April 1989 which is approximately 40 kg. (1 kg.=20 baht).

\*\* - price of feed provided by the project is 4.42 baht a kg.

\*\* - feed includes both supported by the project and his own feed and also supplemented by those from chicken raising above the pond.

\*\*\* not include those for household consumption