

A GUIDE TO RAISING AND PROCESSING SHRIMP

1- PRESENTATION

1-1 Nature of the Activity

In the past several years, shrimp raising farms have developed significantly, mainly due to the expanding international market.

The shrimp farming concern is composed of three modules :

- a hatchery : from the egg to the post-larval stage,
- a shrimp-raising farm : from the post-larval stage to marketable shrimp,
- a processing workshop : trimming and freezing, cooking.

Each module can exist independently.

Shrimp is a fragile raw material which should be placed in cold storage from the moment it is caught before it goes on to become a frozen or a refrigerated product.

1-2 Alternatives

* Species :

Fresh water species (*macrobrachium rosenbergii*) are discerned from salt water species (examples : *Panaeus monodon*, *Panaeus vannamei*, *Panaeus stylyrostris*, *Panaeus schmitti*, *Panaeus japonicum*).

* Finished Products :

Four variable parameters :

- species,
- caliber : the manner of raising can be adapted to market characteristics. Size can range from several units per kg up to 70-80 units per kg,
- preparation : raw or pre-cooked, whole, decorticated, decapitated, veined, etc.,
- packaging :
 - . fresh or frozen,
 - . bulk or consumer sized (tray, bag, cardboard box).

* Technology:

Hatchery : post-larva supply may or may not be integrated into the shrimp-raising farm. A hatchery has several workshops :

- preparation of reproducers (they can be raised in specific ponds or come from fishing),
- maturing,
- spawning and incubation,
- larva raising.

Larva can be raised using two techniques :

- In clear water : the more sophisticated technique, nutrients are progressively distributed according to the larva stage.
- In green water : algae is produced in basins, into which the larvae are placed, and then the artémias.

Preparation of food:

- . Cultures of algae for the first phase of feeding,
- .Hatching basins for "artémias"(marine plankton);

Raising : Here, the larvae go from the post-larval stage to commercial size. Methods are categorized as semi-intensive, intensive, or super-intensive (extensive methods are being abandoned)..

Semi-intensive Method

There is a pre-fattening phase in small basins (1-2 hectares or less), where the larvae are stocked at a density of 50-200 post-larvae per m².

After 45 days to 2 months, their weight is up to 1-2 grams, they are transferred into larger basins (up to 20 hectares). This is the fattening stage. Density is then from 3 to 7 shrimp per m². They remain there up until they are of marketable size. This takes 4 to 5 months..

Intensive and Super-intensive Methods

The raising principles are the same, but there are attempts to maximize the yield by optimizing production elements :

- permanent oxygenation of the basins either by powerful aeration (surface aerators) or by rapidly changing the water in the basin (5 to 50 % daily replacement)
- Feeding with protein rich extracts (40 % proteins).

These methods use significant amounts of technology (aeration, pumping, feeding...). The average yield is 10 tons/hectare for intensive methods, and 20 tons/hectare for super-intensive methods with respective initial densities being 30-40/m² and 100-200/m².

Among the other raising alternatives, we cite :

- type of basin : of earth (most common) or of concrete. Widely varying area (from several hundred m² up to 50 hectares).
- catching methods :
 - . total emptying of basins,
 - . partial emptying of basins, attracting the shrimp with light,
 - . no draining, use nets in the basins.
- integration or not of food production.
- eventual primary transformation : in all cases, the shrimp are washed, drained, and put on a bed of ice, all on site. The raising farm could also carry out primary processing (decapitation, packaging, etc.).

Processing : The type of processing will depend on the market to be exploited:

- Fresh sales : wash, put on ice, package (in bulk or bags + in styrofoam cases), and commercialize either in a local market or export by air.
- Frozen products sales : wash, put on ice, cold buffer storage, decortication and decapitation, precooking or cooking, freezing before or after packaging

There are several freezing techniques :

- Freezing tunnels with stainless steel grid carts , trays of shrimp are frozen semi-individually or in blocks of ice.
- Freezers with liquid beds.

1-3 Types of Possible Units

3 semi-intensive units will be considered. (These are by far the most common). They vary in raising capacity and the presence (or not) of annex workshops (hatcheries, processing, etc.).

Unit A : medium capacity unit, 100 tons of fresh water shrimp (macrobrachium). are raised, independent.

Unit B : large capacity unit for raising shrimp (400 tons/year), with hatchery and processing modules.

Unit C : very large capacity unit for raising shrimp (1000 tons/year), with hatchery and processing modules, and a food mill.

2- TECHNICAL AND ECONOMIC GUIDE

2.1 Description of the Unit

2.1.1. Finished Products

	UNIT A	UNIT B	UNIT C
Species	Macrobrachium Rosenbergii	Panaeus monodon " japonicum " vannamei " duorarum	Panaeus monodon " japonicum " vannamei " stylyrostris " schmitii
Types of finished products	- Fresh, on ice	Frozen shrimp . decapitated . decorticated . precooked	- Whole frozen shrimp
Packaging	- bulk - Styrofeam boxes	Cardboard boxes lined w/cellophane	- Bags - Capped boxes
Sizes	2,5 kg	2 kg	0,5 kg
Production annual	100 tons	400 tons	1000 tons

2-1-2 Technological Choices

OPERATIONS	TECHNOLOGICAL OPTIONS	SOLUTIONS		
		UNIT A	UNIT B	UNIT C
Hatchery	- Integrated or not - Ponds w/reproducers or purchase of wild reproducers - Clear or green water methods	No hatchery	Hatchery According to area	same as B
Raising	- Intensive, semi-intensive or super-intensive	Semi intensive	Semi intensive	Semi intensive
Gathering	- Partial or total draining of basins or gather with nets (seines)	Nets	Total draining of basins	Partial draining + seines
1st packaging	- If processing : wash, decapitate and other processes, keep on ice beds. - Direct sale : wash, sort put on ice	"As is" sale of shrimp (whole) on beds of ice + sawdust (to keep them alive)	Whole shrimp processing	On site shrimp processing (with or without heads)
Processing	+ or - mechanized		+ or - mechanized	Same as B
Receiving	- Sorting table			
Weighing	- Manual			
Sorting and cleaning	- Later decortication and decapitation		Sorting only	Decapitation decortication
Treatment	- Avoid blackening of heads		Metabisulfite	Same as B
Storage	- In cold room : water + ice + sugar + salt bath		Cold-buffer storage	Same as B
Packaging	- Before or after freezing		After	Both
Freezing	-Liquid bed chamber -Freezing tunnel for individual or block freezing		Liquid bed chamber	Ice blocs and individual freezing
Packaging	- Plastic film + cardboard external wrapping - Cellophane + cardboard - Isothermal containers		Capped trays external cardboard	Cardboard lined with cellophane
Storage	- Cold rooms (refrigeration or freezing)	Refrigeration cold room	Freezing room	Same as B
Transportation	Refrigerating containers	Refrigerated or isothermal trucks	Refrigerating containers	Same as B