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Shrimp Aquaculture  
in New Caledonia

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**Abstract** — *In New-Caledonia, there is no indigeneous shrimp species for commercial aquaculture and it is necessary to control the complete cycle in captivity. Since 1973 and the creation of the Station d'Aquaculture de Saint-Vincent (S.A.S.V.), a joint project between IFREMER, France-Aquaculture and the territory of New Caledonia, nine species have been tested and for one of these, *P. stylirostris*, (introduced in 1980) we are now in a commercial scale production with the tenth generation obtained in captivity.*

*A semi-intensive grow-out technique, with pelleted feed, in 8 to 10 ha earthen pond, at a stocking density of 15 to 20 P10/m<sup>2</sup>, give commercial and effective yields of 2 to 3 tonnes/ha/year with two crops per year. On the experimental scale yields rise to 5 or 6 tonnes/ha/year.*

*Over and above the experimental S.A.S.V. (breeders, maturation facilities and larval rearing for 20 millions of post-larvae/year + 10 ha of pond) there are now in New Caledonia :*

- 165 ha of pond in production.
- + 16 ha in construction.
- + 120 ha in project.

*— a production hatchery for 50 millions of post-larvae/year with its stocks of breeders and maturation facilities,*

- a manufacture of feed (IFREMER/N.R.M. feeds/SICA NC),
- a processing plant for IQF whole frozen prawn (raw or cooked).

*An inventory of the estimated 3 000 ha available for the development of aquaculture is conducted by IFREMER with the SPOT satellite.*

*To increase the yields and decrease the cost price we are now working on :*

- an intensification of the rearing with stocking densities of 25 to 30 Pls/m<sup>2</sup> and oxygenation,
- an improvement of the pellet,
- a reliability of the hatchery (already 45 millions of Pls in 1988).

*New Caledonia is a small French territory (400 km long, 50 km wide) located between Australia and New Zealand.*

In New Caledonia, the aquaculture is directed by the « Station d'Aquaculture de Saint-Vincent (S.A.S.V.) » located about 70 kms from Nouméa, main town of the country.

This experimental station was created in 1972 on the initiative of South Pacific Commission and with the aid of the F.A.O.. Since 1978, it is managed by **France Aquaculture**, subsidiary of **IFREMER**, and financed jointly by the Territory of New Caledonia and **IFREMER**.

It works in collaboration with **AQUACOP** on :

— Molluscs :

- culture of the green mussel (*Perna Viridis*);
- culture and reproduction of the indigeneous trochus (*Trochus niloticus*);

— Crustaceans :

- *Macrobrachium rosenbergii*, at a small scale because of the few sites available;
- marine shrimps, the main activity, as there is in New Caledonia :
  - \* favourable climatic conditions allowing year round production,
  - \* an abundance of suitable sites, on the western and North coast, just behind the mangrove coastline, very good for big earthen pond. An inventory of these estimated 3000 ha available for the development of aquaculture is now conducted by IFREMER with the SPOT satellite.

For the marine shrimp aquaculture, in the seventies the first species studied were the indigeneous ones : *P. merguensis*, *P. monodon*, *P. semisulcatus*, *M. ensis*. Other species have been imported : *P. monodon* from Fiji and from Malaysia, *P. japonicus*, *P. orientalis*, *P. stilirostris* from Panama and from Mexico.

*P. stilirostris* (mexican strain), imported in 1980 is really appropriate to the caledonian context with two very different seasons (summer temperature of the pond 32/33° C., winter temperature 18/20° C.). This species is now used on a commercial scale production with the 12th generation obtained in captivity.

## 1. SITUATION IN FEBRUARY 1989

Over and above the « S.A.S.V. » there are now a local pellet manufacture (SICA/NRM feeds) and 4 private marine shrimp farms or 171 ha of ponds :

— **SODACAL** : located at MOINDOU, 130 kms far from Noumea. It is an integrated farm with :

- its own hatchery (capacity of 50 million PLs/year, 30 million produced in 1988 for its first whole year production).
- 132 ha of ponds
- its own processing plant in Nouméa (capacity 5T/24 hours).

This farm, **IFREMER** is the main shareholder, must prove that the big farms can technically and economically produce and export prawns

outside New Caledonia. In 1988 it produced about 200 tonnes of shrimps, 145 tonnes have been harvested, 70 tonnes exported. The mean cost price was about 1000 CFP (8.7 US \$) per kilo.

— **AQUAMON** : 25 ha of ponds, 50 kms far from Noumea, which harvested 57 tonnes in 1988, with a mean yield of 2.6 T/ha/year. These shrimps have been sold on the local market.

— **CHEVALIER** : 6 ha of ponds (9 ponds of 0.2 to 3 ha).

— **DUMBEA'S BAY** : 1 pond of 10 ha.

On the last six years Caledonian shrimp aquaculture produced :

1983 : 19 tonnes  
 1984 : 54 tonnes  
 1985 : 95 tonnes  
 1986 : 65 tonnes  
 1987 : 87 tonnes  
 1988 : 240 tonnes

In 1989, a production of 350 tonnes of shrimps, with the same farms as in 1988, is expected. 210 tonnes will be exported.

20 ha of new ponds are under construction and about 120 ha planned. And this year **AQUAMON** will begin the construction of a big production hatchery which could induce the construction of new ponds. The goals of the « **S.A.S.V.** », in 1989, in this development process, remain :

— to improve the techniques in the local context in collaboration with **AQUACOP**,

— to transfer these techniques to production,

— to train the present and the future producers,

— to give technical assistance to the producers,

— to maintain stocks of breeders to secure the production.

## 2. THE TECHNIQUES

The shrimp aquaculture in New Caledonia is based on a reproduction in captivity, larval rearing in controlled conditions and a semi intensive grow-out.

### 2.1. The reproduction in captivity

The breeders are reared, at low density (5/m<sup>2</sup> till 20 grs and less than 1/m<sup>2</sup> after), in small earthen ponds (0.1 to 0.3 ha). In 8 months 60 to 70 grs females and 45 to 50 grs males can be obtained. At the harvest of the pond breeders are placed in 7 m<sup>2</sup> maturation tanks in a closed maturation room. The maturation technique is the **AQUACOP**'s technique with :

— ablation of the females,

— artificial photoperiod; daytime 12 to 14 hours,

— separate stocking of males and females : 10 animals/m<sup>2</sup>,

- adjusted temperature of the water : 29°C + - 1°C for the females and less than 28°C for the males,
- mixed food 3 times a day : pelleted feed and fresh food (squid, mussel, shrimp),
- 50 % of water renewal,
- artificial insemination of the females ready to spawn,
- common spawning tanks (5 to 6 females).

Before each exploitation the males are checked, the spermatophores are observed under an epifluorescent light microscope after an acridine coloration. If the sperm seems inappropriate, all the males are ejaculated and used only after a ten days regeneration period.

By this way, steady results can be expected :

- more than 3 spawns/female/month,
- about 400 000 egges/spawn,
- 20 to 30 % of fertilization,
- 70 to 80 % of hatching.

## 2.2. The larval rearings

They are conducted till P3 stage in 5 or 10 m<sup>3</sup> fiber tanks at an initial density of 100 Nii/litre. at 29°C + - 1°C.

The normal sea water (treated with EDTA 5 grs/m<sup>3</sup>) is filtered over 1 µm. The water renewal is low at the zoea stages but important (50 to 100 %/day) at the mysis and post larva stages.

The larva are fed algae (Z1), algae + microparticule diets (Z2, Z3), algae + artemias + microparticule diets (M1), artemias + microparticule diets (after M1).

Antibiotics (furazolidone, chloramphenicol) and antifungol (trifluorine) are used at preventive or curative doses. The survival Nii/P3 is of 50 to 80 %.

After P3 (15 days of larval rearing) the post larva are gradually acclimatized (temperature, filtration of the sea water) to the outside conditions and P5 are transferred to a nursery 7 days phase :

- 1.5 million PLS in an outer cement tank,
- 50 % of daily water renewal, sea water filtered in 50 then 300 µ,
- artemias and microparticule diets,
- survival between 70 and 95 %.

## 2.3. The semi intensive grow-out

It occurs in 8 to 10 ha ponds filled by pumping.

2 or 3 days after the filling up of the pond, 15 to 20 PLS/m<sup>2</sup> are stocked.

The daily water change raises from 5 % during the first month to 25 % on the last month.

The growns are fed 3 times a day with the local pellet which cost about 0.9 USD/kg. The daily feeding rate increases till 5 grs (4 %) and then decreases : 3 % at 10 grs, 1.5 % at 20 grs.

The pH varies between 25 to 41 %. without problems.

Every week the growth and the sanitary aspect of the shrimps are controlled by catching about 400 shrimps with a cast net. After 5 to 6 months rearings we obtain the following results.

- 20 to 22 grs animals,
- 2 tonnes of shrimps/ha (extrapoled yields 4T/ha/year),
- food conversion ratio : 2 to 2.5,
- survival 50 to 60 %.

After each rearing, the pond is dried out, the bottom is ploughed and the competitors are eliminated with rotenone.

NB : extrapoled yields of 6T/ha/year have already been obtained on small 1000 m<sup>2</sup> pond at the experimental station.

### 3. CONCLUSION, PERSPECTIVES

Now it is very profitable to product shrimps and to sell it on the caledonian market at the price 1500 CFP (13 US\$)/kg. But this local market can only absorb about 150 tonnes/year.

It is much difficult to make some profit on the export market were the best price obtained is 9.3 US \$ (CAF price).

The cost price must be lowered and that is now the goal of most of our works, specially on :

- the intensification of the rearings, with stocking densities of 25 to 30 PLS/m<sup>2</sup>, which needs an oxygenation of the ponds. AIRE O2 acration systems are used, 30 to 40 HP/10ha. The first trials are very good and, in such conditions, mean yields of 5 T/ha/year can be expected (on 1 ha pond, a current trial will produce more than 4 T/5 months),
- the improvement of the pellet (better growths can be obtained),
- the increase of the reliability of the hatcheries. The first larval rearings on biological filter (without water renewal) are now realized.

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