DESCRIPTION OF THE SYSTEM IN KUNDAPUR

There were 70 ponds in the study selected to represent all of the ponds in the area. Details were collected from the 1999/2000 production cycle and also about the previous two production cycles by questionnaire.

THE 1999/2000 PRODUCTION CYCLE

THE PONDS

Size of the ponds Average 0.62ha
Smallest 0.14ha
Largest 1.62ha

In addition to the manager
19% had no other workers
45% had one other
27% had two others
8% had more than two

POND PREPARATION

90% of the ponds were dried, 53% had soil removed and 8% were ploughed.

100% were limed, 79% used shell lime, 65% Dolomite and 10% agrilime.

89% were limed once and 11% twice or more.

71% were limed when dry, 17% when wet and 2 with water in.

89% used fertilisers including :

DAP	47%
Super phosphate	44%
Urea	42%
Ammonium sulphate	10%
Organic material	8%

79% used some form of pest control including:

Tea seed cake	74%
Bleaching powder	29%
Neem Cake	10%

AT STOCKING

At stocking the water quality was measured by the research assistant and he also looked for wild animals in the pond.

The average pH was 8, the lowest 7 and the highest 9.

Crabs were seen in 15% of ponds and insects on the surface of 27%.

Most farms only stocked once with only 6% stocking more than once.

Date of stocking was from 16/9/99 to 23/1/00.

27% stocked before 1st Nov.
26% from the 1st to 15th Nov.
21% from 16th to 30th Nov.
and 26% after 30th Nov.

The average transportation time was 2hr and the average acclimation time was 1hr 54mins.

In the farmers' opinion only 2% of the batches stocked were bad, 44% were average and 54% were better than average.

The average stocking density was 8/m^2, the lowest 3/m^2 and the highest 22/m^2.

FEED

All the ponds were fed mostly commercial pelleted feed, with 69% feeding only one brand and 31% feeding more than one.

OTHER ADDITIVES

Lime was used by 98% of farmers and eggs by 90%. Vitamin mineral supplements by 76%. Fertilisers by 58%. Antibiotics by 55%. Probiotics by 50%. Zeolite-like substances by 48%. Sanitisers by 23% and immunostimulants by 6%.

FARMERS' OPINIONS

Farmers reported the following opinions during the production cycle.

10% reported better than normal feeding, 80% normal feeding and 10 worse than normal feeding.

7% reported better than normal growth, 90% normal growth and 3% worse than normal growth.

15% reported better than average survival, 74% average survival and 11% worse than average survival.

OBSERVATIONS BY THE RESEARCHERS

Water quality measurements were taken during the cycle, these included:

	Ave.	Lowest	Highest
Salinity	19	12	34
pH	8	7	9
DO	6	3	11
DO% sat.	87	39	150
Secchi	22	11	43

The researchers reported seeing wild shrimp in 92% of the ponds, algae on the bottom of 76%, crabs in 63%, fish in 52%, snails in 26% and worms in 24%.

SHRIMP EXAMINED 6 WEEKS AFTER STOCKING

Shrimp were caught by cast net and the average weight of the shrimp and the average was 6g, the lowest 2g and the highest 11g.

HARVEST

The average weight of the shrimp at harvest was 21g, the lowest average weight in a pond was 3g and the highest 38g.

Harvests occurred from 25/11/99 to 22/4/00, with

26% before the 31st of Jan.

24% from the to 16th of Feb.

24% from the 17th to the 29th of Feb.

and 26% after the 29th of Feb.

The signs of poor health were observed in the following % of ponds.

Damaged appendages in 100% of ponds, abnormal colour in 100%, soft shell in 77%, white spots in 52% and shell deformities 40%.

A number of other animals were seen at harvest including fish in 66% of ponds, wild shrimp in 46%, mud crabs in 11%, snails in 8% and jelly fish in 11%.

PRODUCTION DATA

	Ave.	Lowest	Highest
Length of cycle	87 days	32	124
Survival	52 %	5	92
Ave. wt. Harvest	21g	3	38
Kg/ha	786	94	2276

PRODUCTION OVER THREE CYCLES

99/00 refers to the crops stocked at the end of 1999, **1 ago** is the previous crop before that and 2 ago is crop before that.

	2 ago	**1 ago**	**99/00**
Source of feed			
CP	55	41	37
Avanti	28	28	27
Higashi	4	5	19
Higain	2	5	8
Goldcoin	10	18	5
Godrej	0	0	3
Mysore	2	0	0
Lux	0	2	0
Hatcheries			
Skyline	41	42	38
Priya	2	14	26
Deejay	23	23	23
Tradelinks	16	17	13
Madras	12	3	0
Cochin	2	0	0
Production			
Stocking density/m^2	9	7	8
Length of cycle (days)	88	100	87
Survival (%)	58	62	52
Ave. wt Harvest (g)	20	24	21
Kg/ha	939	973	786

PCR

The test used to detect the virus was PCR. This test allows you to detect very small amounts of the virus. It does not tell you if the virus is alive or dead – it can be positive if only dead virus is present.

We sampled a large number to allow us to detect the virus even if only a few PI were infected (300 = 1% prevalence at 95%).

There are two types of PCR. The first one is '1 step PCR' this will only detect larger numbers of viruses. It is also possible to continue the test to make it more sensitive this is '2 step PCR' or 'nested PCR'. This will detect very small amounts of virus.

PCR detects very small amounts of virus. The virus can be dead. Therefore, a positive PCR results does not mean that the disease is necessarily present.

HISTOLOGY

Samples were also processed for examination under the microscope. It is possible to see the changes in the shrimp under the microscope that are typical of White Spot Disease. This technique can only detect the disease when the shrimp are sick and takes a long time.

SAMPLES COLLECTED

PL at stocking – 500/batch.
After 6 weeks by cast net – 100/pond.
Dead during the production cycle.
At harvest – 500/pond.
Wild shrimp and other animals inside and outside the ponds.
Plankton in the pond and estuary.
Feed samples.

RESULTS FROM PL

The PI were tested in groups of 50 until a positive result OR until 300 (6 batches of 50) were negative.
3 samples were '1 step PCR' positive and a total of 35 out of 73 or 48% were positive for WSSV.

RESULTS FROM 6 WEEKS

Cast net shrimp samples from 6 weeks are still being processed. 6 out of the 70 ponds (9%) were positive for plankton from inside the ponds.

RESULTS FROM DEAD SHRIMP

Dead shrimp collected by the farmers from 44 ponds for PCR. During the production cycle 19 tested '1 step PCR' positive (Large amounts of virus), 29 tested positive by '2 step PCR'.

Total of 29 out of 44 ponds or 66% positive for the presence of the virus.

Farmers also collected samples from 50 ponds for histology. 32 ponds out of 50 were positive for White Spot Disease or 64%

RESULTS SHRIMP AT HARVEST

Samples were collected from 62 harvests for PCR, 39 were positive by '1 step PCR' (63%). In total 59 were positive (95%) and only 3 ponds were negative (5%). Samples were collected from 62 ponds for histology, 34 were positive for White Spot Disease (55%). This means that some of the PCR positive ponds did not have the disease.

RESULTS FROM FEED

Samples were collected of all the feed fed to each pond. This was all mixed into one pooled sample. We tested only one sample per pond. 30 out of the 70 pooled samples were positive by '2 step PCR' (43%) and none were positive by '1 step PCR'. These positive results do not mean that there was live virus in the feed.

ANALYSES OF INFORMATION AND EPIDEMIOLOGY

The objective is to compare farms that have good production with farms with bad production. Then find out what is different about the good farms compared with the bad. How do you define a good pond or a good outcome?

An outcome is a result or a way of separating good ponds and bad ponds

In this study we used several outcomes :

- Kg/ha
- Average weight of shrimp at harvest
- Length of production cycle
- Presence of WSSV at harvest

We used the information from 70 ponds, calculated the average production and then divided all the farms into good or bad if they were above or below the average.

We than compared all the information with the outcomes and looked for differences between the farms. Things that were different between the good and bad ponds are ASSOCIATION not solutions. At the moment all we have is associations. These will have to be tested to determine if they help to improve production. At the moment they are only suggestions. We will list the associations and then discuss them – please do not think this is a list of instructions or management solutions.