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A SOCIO-ECONOMIC SURVEY OF SHRIMP AQUCULTURE PRACTICES IN VALSAD DISTRICT, GUJARAT, INDIA

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ABSTRACT

For overall development of aquaculture, it is necessary to study socio-economic profile of shrimp farmers and to understand the nature of shrimp farming practices followed and also farmer's perceptions about the aquaculture. The present study was carried out in valsad district of Gujarat state, India during July 2015 to November 2015. The detailed study was carried out on 38 shrimp farms with respect to the culture practices, pond preparation, stocking, feeding management, production and marketing. For the socio-economic component of the study, 108 shrimp farmers from coastal villages of Valsad including Kosamba, Bhadeli, Hingraj, Malvan, Untadi, Bhagal, Nani-bhagal, Kakwadi, Nanidanti, Motidanti were randomly chosen and data was collected by pre-tested questionnaire. Meetings of various shrimp farmers and fishermen were organized nearby motidanti village to assess the impacts of shrimp farming. The present survey study revealed that shrimp farming has contributed significantly in employment generation and infrastructure development of the coastal community and overall development of the coastal areas. This case study also revealed that aquaculture is risky business but farmers still consider it as a profitable venture with high status.

KEYWORDS: Socio-Economic, Aquaculture, Shrimp Farming, Valsad

INTRODUCTION

Gujarat shrimp farming was started traditionally in 1980s and grew at a phenomenal rate during 2014-2015. Gujarat is having 1,600 km long coastline and a vast stretches of brackish water area (3.76 lakh hectare) throughout the coastline which is ideal for shrimp culture. As of 1991, 294 farmers had applied for land in Valsad district, of which 51 have been allotted a total extent of 290 hectare of land (Coastal Aquaculture Authority). Gujarat shrimp farmer intensify culture practice with adopt higher bio-security for better growth rate and tolerance against disease problems. Valsad district including Navsari area covers 90 km. coastline area. Under Coastal Aquaculture Authority (CAA) around 105 farmers have registered for shrimp farming from year 2007 to 2014 in Valsad. Previously, farmers were habituated to culture *Penaeus monodon* but presently they are diversified to *Litopenaeus vannamei* because of its high market value and lower cost of operation as compared to *P. monodon.* Valsad district having numbers of coastal villages like Kosamba, Bhadeli, Hingraj, Malvan, Untadi, Bhagal, Nani-bhagal, Kakwadi, Nanidanti, Motidanti, which are participating in shrimp culture

practices. According to Kumaran *et al.* (2003), and Vadher *et al.* (2007), shrimp farming was successfully practiced in Andhra Pradesh and Gujarat, although with some constraints. Shrimp aquaculture has contributed significantly in employment generation and infrastructure development of the coastal community and overall development of coastal areas. The present study was aimed to describe the socio-economic characteristics of shrimp farmers; to identifying the production constraints affecting aquaculture development; to determine the profitability ratio of shrimp farming and to assess the level of the participation of women in aquaculture.

DATABASE AND METHODOLOGY

Shrimp farming practices detailed study was carried out on selected 38 shrimp farms of Valsad district from village Motidanti (11 farms), Kakwadi (10 farms), Bhagal (5 farms), Malvan (3 farms), Untadi (1 farm), Kosamba (1 farm) and from Bhadeli (1 farm). Detail economics and shrimp culture practices including pond preparation, stocking, feeding management, production and marketing and advancement of biosecurity concept on farm site during year of 2015 was recorded with the help of pre tested questionnaire.

Case study of pond performance was carried out on 5 shrimp farmers from different parts of Valsad. Two ponds has been selected to evaluate the total economic cost of farming operation during the year of 2015. For the detail of pond performance, shrimp ponds were selected from each shrimp farmer and with the help of pre tested questionnaire regularly visits were conducted on selected farms once in a week throughout the culture period. Measurements like pond area, stocking density, days of culture (DOC), harvested biomass, feed conversion ratio (FCR), average body weight, total feed consumption, seed survival rate, count, etc., were recorded from 5 selected shrimp farms.

For socio-economic component, educational status, age, occupation, farm size, farming experience, was recorded by interview method with the help of pre-tested questionnaire. Meetings of various shrimp farmers and fisherman nearby coastal villages were organized to assess the impacts of shrimp farming.

RESULTS AND DISCUSSIONS

A detailed study was carried out once a week throughout the culture period with respect to the culture practices, pond preparation, stocking, feeding management, production and marketing. All information of 38 shrimp farms, starting from pond preparation to marketing of harvested shrimp are shown in this paper. The present survey revealed that shrimp farming practice in Valsad district was advance from the past practices and the expansion of bio-security was observed for better production (specific data for the measurement of advancement is not available and hence advancement was observed based on the recent advancement in the expansion of infrastructure for biosecurity compare to past, and its share in the total cost of production).

After harvesting, most of the farmer's generally use to sun dried pond for 20 -30 days till the crakes on bottom become 2-inch dip. Bottom was being scraped by tractor until 3-4inch plough deep. They are habituated to apply agricultural lime @ 500-800 kg/ha as a basal dose with 150 kg of dolomite and 25 kg of zeolite to adjust the pH and to get a proper algal bloom. In most of the cases, farmers use to pump water from the creek into the reservoir pond and disinfected it by using bleaching powder @ 400 Kg/ha. De-chlorination was done by keeping same water as it was for 3-4 days and then transfers it from reservoir pond to culture pond by feeder channel. Some farmers for development of sufficient natural food in the pond are habituated to use a mixture of Rice bran @10 kg, Sugar @10 kg, Yeast @100 gm in

50 litres of water for one ha pond.

Table 1: Valsad District Shrimp Farming Villages

Name of Village	No. of Farm	Total Water Spread Area (ha.)
Bhadeli	17	53.55
Palsana	11	33.35
Malvan	22	57.55
Kakawadi	10	31.8
Danti	14	43.16
Bhagal	9	11.8
NaniBhagal	5	3.28
Untadi	6	3.6
Umbergam	6	4
Hingraj	5	3.7
Kosamba	5	3

Source: 2007-2014 registered under Coastal aquaculture authority

Table 2: Profile of Shrimp Farmer of Valsad District

Sr. No.	Profile Characteristics	Frequency and Percentages (Total-108 Farmers)
A.	**Educational status**	
	1. Illiterate	4(3.70%)
	2. Primary school level	46(42.59%)
	3. Up to SSLC	37(34.25%)
	4. Graduate and above	21(19.44%)
B.	**Age**	
	1. Up to 40 years	63(58.33%)
	2. Above 40 years	45(41.66%)
C.	**Occupation**	
	1. Aquaculture alone	19(17.59%)
	2. Aquaculture with fisherman	55(50.92%)
	3. Aquaculture with others	34(31.48%)
D	**Farm size**	
	1. Up to >2 ha.	35(32.40%)
	2. 2-5 ha	47(43.51%)
	3. Above 5 ha.	26(24.07%)
E	**Farming experience**	
	1. Up to 5 years	82(75.92%)
	2. Above 5 years	26(24.07%)

Table 3: Farmers' Perceptions of Aquaculture

Sr. No.	Farmers	Percentage of Answering "yes" (Total-108 Farmers)
1.	Aquaculture is a risky business	31(28.70%)
2.	Aquaculture is profitable	37(34.25%)
3.	Aquaculture has high status	21(19.44%)
4.	Aquaculture is only profitable for large-scale farmers	1(0.92%)
5.	Disease is an important issue	16(14.81%)
6.	Disease doesn't occur in small-scale farms	2(1.85%)

Table 4: Pond Performance

Detail	Jalaram Aqua Farm		Laxmi Aqua Farm		Hiral Aqua Farm		Maa Kali Aqua Farm		Mahalaxmi Aqua Farm	
	1	2	1	2	1	2	1	2	1	2
Name of owner	PravinbhaiDevjibhai Tandel		ShankarbhaiHaribhai Tandel		Sagar Sharadbhai Tandel		VimalbhaiHaribhai Tandel		DalshukbhaiLaluubhai Tandel	
Registration no	GJ-II-2010(508)		GJ-II -2008(0097)		GJ-II-2007(0009)		GJ-II-2010(486)		GJ-II-2007(0013)	
Location of farm	Kakwadi		Malvan		Kakwadi		Malvan		Moti Danti	
Pond area	0.90	0.88	1.10	0.88	0.95	0.92	1.08	0.91	0.96	0.95
Hatchery name	BMR Chennai		Evergreen		BMR Chennai		BMR Chennai		Tandel's	
Density (Pcs/m2)	40.44	40.43	28.94	29.31	40.22	32.30	29.08	28.95	36.45	36.82
Day of culture	194	195	194	103	189	186	192	197	191	195
Stocking population	364000	356000	319000	258500	384000	296000	313500	264000	350000	350000
Harvesting population	251086	266391	251051	195171	264891	240364	241779	199952	256701	253166
Survival rate %	68.98	74.83	78.70	75.50	68.98	81.20	77.12	75.74	73.34	72.33
Biomass (kg)	7306	6294	7068	2913	6383	6158	6501	5778	6842	6898
Count	34.37	42.32	35.52	67	41.5	39.03	37.19	34.61	37.52	36.7
Average body weight	29.10	23.63	28.15	14.93	24.10	25.62	26.89	28.89	26.65	27.25
Total Feed (kg)	12430	11921	12074	4473	10896	10614	12010	9527.90	10766	10890
Feed conversion ratio (FCR)	1.70	1.89	1.71	1.54	1.71	1.72	1.85	1.65	1.57	1.58
Production/ha/kg	8118	7152	6425	3310	6719	6693	6019	6349	7127	7261
ADG (gm/day)	0.15	0.12	0.15	0.14	0.14	0.13	0.14	0.14	0.15	0.14
Salinity rang ppt	28-32	28-34	28-32	25-32	28-33	24-30	25-31	22-30	28-32	24-28
Feeding method	Dike	Dike	Dike	Dike	Dike	Dike	Dike	Dike	Dike	Dike

L. vannamei and *P. monodon* seeds (PL-20) were purchased at the average rate of Rs 0.55 per piece (Rs 550-600per thousand pieces) from commercial hatcheries such as BMR Chennai, Matha, Skyline, Evergreen and Tandel's hatchery. Seeds were packed in polythene bag and master packed in thermo coal box. The average seed density per one bag was 2300 to 2500 seed approximately. Majority of farmers stocked at a density of 25-30 no./m^2 in ponds. Before stocking, some farmers check the quality of seed by manually while some farmers send their seed for testing its quality in private laboratories. Large scale farmer use to keep seeds in well aerated tank in order to acclimatize the seed with pond water while small scale farmers follow the traditional splashing method for stocking.

The major shrimp feed companies in Gujarat shrimp aquaculture market are CP aquaculture (India), Avanti Feeds, Godrej Agrovet Feeds, The Grobest Feeds and Nexus Feeds. Majority of farmers were using Avanti commercial pelleted feeds and followed by Godrej Agrovet and Growel feeds. The cost of the feed was Rs 84/kg and Rs 2100/25kgs. Frequency of feeding varied from 2-5 times during the culture period (twice per day up to one month, 5 times/day up to second month and 4-5 times/day after 90 days). About 1200-1500 kgs of feed/ha/crop was being used. The average feed conversion ratio (FCR) for intensive feeding was 1.3-1.5 and commercially available probiotics mixed with zeolite @7 kg per ha was also applied once in 15-30 days depending on the pond bottom condition. District level trader provided feeds and other inputs were procured on credit basis and the trader was paid a commission of Rs 15-20/kg for harvested shrimp in addition to 10-20% interest for the loan. Some farmer having more than 25 farms, were directly importing feeds from Andhra Pradesh and store in well established store room.

For the management of pond, farmers generally employed responsible person (farm supervisor) from nearby village and they were paid per month Rs 10,000. On an average, two labours per hectare are employed from other state mainly Odisha (Orissa) and were paid per Rs. 5000-5500 per month. Most of the farmers were regularly monitored soil and water quality conditions of ponds, feed intake and health of the animals. Additional casual labours were being employed during harvest and post-harvest operations. Sampling of shrimp was being carried out at every fifteenth day interval during

the crop by feed company technician.

Average Shrimp crop is yielded 900 kg to 1800 kg/ha/crop in 110-130 days. The process of shrimp transportation from pond to loading container is conducted by women participation. Seafood processor from Mumbai, Chennai, and Veraval directly communicate to farmer for buying the harvested crop on a regular basis. Confirmation of date and time is decided by particular buyers before harvesting of shrimp from culture crop. Many farmers use to sell harvested shrimp to feed dealers who had supplied the feed and other inputs like probiotics and other medicines on credit. Price of harvested shrimp is influencedue to the season, stage and time of harvesting.

The detailed profile of shrimp farms of Valsad district is showed in table 2. Regarding the educational status, around half of the shrimp farmers (46.59%) had studied at primary level and about 3.70% of the farmers were illiterate (Table 2). 58.33% of the shrimp farmers are up to 40 years old age and around 50.92% farmers are active as a fisherman in addition to aquaculture business. In contrast, only 17.59% of farmers only rely on the aquaculture business as a main source of income.

Most of the farmers have farm size in between 2-5 ha (43.51%) and 33.40% of farmers have farm size >2 ha farm size. Most of the farmers surveyed have less than 5 years of experience (75.92%) and 24.07% of farmers have more than 5 years of experience. This socio-economic survey revealed that majority of the shrimp farmers of the district are literate and shrimp farming has contributed significantly in employment to the coastal villages men and women and in overall development of the coastal areas.

Farmers were asked about their view over aquaculture and the responses are presented in Table3. Although farmers acknowledged that aquaculture is risky business (28.70%), they still considered it profitable (34.25%) and to have high status (19.44%). Apart from this, most of the shrimp farmers consider disease as a major constraint in aquaculture practices.

Valsad district women of coastal villages took an active part in shrimp harvesting. Their major participation was in pond construction, pond renovation and harvesting of shrimp. During harvesting time, they were paid Rs200-250/ day. The villagers reported that the standard of living in coastal villages have improved after the development of shrimp farming.

According to direct meeting with farmer, in year 2009-2010 whole crop of shrimp farming was fall down due to disease outbreak in Valsad district, and small scale farmer goes to total economic lose. For prevention against disease biosecurity concept is important. Earlier, there were no specific preventive measures were carried out by small scale and large scale farmers for disease prevention. Terrestrial animal like dog, birds and aquatic animal like crabs could become carrier of virus for disease transmission from infected pond and this resulted in the introduction of biosecurity concept on shrimp farms. Basic criteria like use of crab fence at inlet and outlet pipe, use of bird scare lines on culture pond, special fence on the periphery of pond for domestic animal (dog fence), screen net on the mouth of inlet and suction pipe, feeder channel replace with PVC pipe, foot wash and hand deep at entry of the farm with $kmno_4$ for people involving in farming practices (Workers, Technician, Guest, visitors, trainee students), cast net washing with $kmno_4$ during each sampling were decided by the shrimp farmer association to combated the disease outbreak. These all criteria are followed by most of the shrimp farmers in the current time in Valsad district and from the year 2010 onwards more and more advancement are being carried out to stretching the biosecurity infrastructure.

CONCLUSIONS

The present case study revealed that shrimp farming is successfully practiced in Valsad District. Shrimp aquaculture is no doubt socio economically very significance practices and has contributed substantially in employment generation and infrastructure development of the coastal community and over all development of coastal villages. The earnings of shrimp farming is remain the main source of income for the small scale shrimp farmer while large scale shrimp farmers are depended on different source of income apart from shrimp aquaculture. The socio-economic condition of the coastal population has also been improved in the Valsad district through shrimp farming. Standard of living in coastal villages have improved after provides regular and additional employment through shrimp farming to local villagers, both for men and women. Disease is the major limiting factor faced by the shrimp farmers and it has become the most burning and threatening issue for shrimp farming communities. Appropriate preventive measures should be taken to combatdisease or else this revenue earning sector could collapse in near future which can adversely affect the socio economic status of coastal communities

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