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Production and marketing aspects of shrimp (*Litopenaeus vannamei*) in Nellore district of Andhra Pradesh

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Abstract
The demand for the sea foods has been increasing over the period of years. Shrimp industry in India is one among the sea food basket that has grown over the years. *Litopenaeus vannamei* (white leg shrimp) is the highly demanded cultured shrimps in India. The total Indian shrimp production was 7,16,004 MT in the year 2023-24. Andhra Pradesh is the leading Shrimp producing state in India. The total production of shrimp (*L. vannamei*) during the year 2023-24 was 4, 56,300 MT. The major share of shrimp production in Andhra Pradesh was shared by districts and Nellore districts with 55.5percent and 44.5percent of total production respectively. In this study, it was aimed to identify the cost of production, constraints faced in production, various marketing channel of shrimp in Andhra Pradesh and also to enumerate the price spread of the shrimp (*L. vannamei*) variety for the existing channel in Nellore districts of Andhra Pradesh. Totally 120 samples that included 80 shrimp farms, 15 hatcheries, 10 input suppliers, 10 middlemen and 5 processing plant and export units was selected for the study. The study revealed that the average gross return per acre/season was Rs. 8, 20, 000 from shrimp cultivation considering the average market price of Rs. 328 per kg of shrimp. The average annual return of Rs. 5, 82, 636 was received per acre/annum. Disease problem and lack of availability of quality seeds are the most important constraints faced by the respondents in the shrimp's production.

Keywords: Shrimp farming, Market status of farmer, Vannamei Cultural practise, Price spread, market efficiency

Introduction
The demand for the sea foods has been increasing over the period of years. Highly nutritious value and medicinal properties has encouraged consumers to move towards sea foods. Shrimp industry in India is one among the sea food basket that has grown over the years. *Litopenaeus vannamei* (white leg shrimp) is the highly demanded cultured shrimps in India.
The total world production of shrimp (*L. vannamei)* was 3,879.78 thousand tonnes. China with 1, 625 thousand tonnes (41.88 per cent) shared the major production of *L. vannamei* followed by India (10.72 per cent) and Indonesia (10. 57 per cent) in the year 2015-16. The other major producing countries were Ecuador contributing10.39percent followed by Vietnam, Thailand, Mexico, Brazil, Malaysia and Honduras with 8.20percent, 7.22percent, and 3.35percent, 1.80 percent, 1.24percent and 0.64percent respectively. (Source: FAO Fisheries and Aquaculture Database).
The total Indian shrimp production was 622327 MT in the year 2017-18. The share of *L. Vannamei* shrimp is humungous when compared to tiger and scampi with 16.36 per cent and 2.04 per cent respectively. Whereas the total area under culture of shrimp was 1, 52, 595 ha of which *L. Vannamei* constituted about 61.18 per cent followed by tiger shrimp 38.82 per cent. (Source: MPEDA, 2017). Andhra Pradesh is the leading Shrimp producing state in India. The total production of shrimp (*L. vannamei*) during the year 2017-18 was 4,56,300MT. The major share of shrimp production in Andhra Pradesh was shared by Nellore districts (55 per cent) Prakasam districts (45 per cent). There is a huge export potential of shrimp from Andhra Pradesh. In this regard, this study was conducted to identify the cost of production of shrimps, constraints faced in shrimp production, various marketing channel of shrimp, enumerate the price spread of shrimp (*L. vannamei*) variety and to find the constraints faced by the farmers in Nellore districts of Andhra Pradesh.

Methodology

Nellore districts of Andhra Pradesh were purposively selected as they were the major shrimp producing districts in the state. Simple random sampling techniques was applied for shrimp farmers and purposive sampling techniques for processors and exporting units was employed for the collection of data. Totally 120 samples that included 80 shrimp farms, 15 hatcheries, 10 input suppliers, 10 middlemen and5 processing cum export units were selected for the study. All the data regarding prices were concernedto2017-18asthestudywas conducted during the period.

Results and Discussion

Cost and returns of shrimp farms

The cost and returns of the shrimp farm per acre were analyzed and discussed in Table1

Table 1: Cost and returns of shrimp farms (in Rs/acre)

S. No.	Particulars	Amount (in rupees)	Percentage to total
A		**Annual Fixed Cost**	
1	Depreciation	14296	2.70
2	Salaries to permanent labour	96000	18.16
3	Interest on fixed capital	82854	15.67
4	Others	1000	0.19
Total annual fixed cost		**194150**	**36.72**
B		**Annual variable cost**	
5	Cost of seed-PL20('000) Cost per Pl@0.36 Praise for 1lakh seeds	36000	6.81
6	Feed	184500	34.90
7	Fertilizers/Medicines/Probiotics	10000	1.89
8	Electricity/Fuel charges	20000	3.78
9	Repairs and maintenance	5000	0.95
10	Harvesting charges	10000	1.89
11	Labour for other operations	20000	3.78
12	Miscellaneous expenses	13190	2.49
13	**Annual variable cost**	**298690**	
14	Interest on working capital	35842	6.78
	Total annual variable cost	334532	63.28
	Total cost/season/crop	528682	100
Average annual returns			
15	Production of shrimp/season(in kgs)	2500	
16	Total value of shrimp @ average price of Rs.328/kg	820000	
17	Income for two crops per annum	1640000	
18	Cost of cultivation for two crops per annum/acre	1057364	
19	Production cost per kg of shrimp(Total cost/yield of shrimp)	**212**	
20	Net income	582636	
21	BC ratio	1.55	

It could be observed from the above table that the average total annual cost incurred was worked out to Rs. 5, 28, 682 per acre shrimp production, out of which Rs 3, 34, 532 (63.28 per cent) was incurred as variable cost (Variable cost is having direct relationship to the level of sales. Variable cost was relevant to economic decision making in short run), while Rs. 1, 94, 150 (36.72 per cent) was fixed cost. The cost incurred for feed(34.90percent) was the major component of the total cost incurred per shrimp farm followed by interest on fixed capital (15.67 per cent), Interest on working capital (6.78 per cent), procurement of post larvae *(L .vannamei*) (6.81per cent), and electricity charges (3.78 per cent) respectively. The fertilizers/medicines/probiotics constituted for 1.89 per cent and repairs and maintenance (0.95 per cent).

The average gross return per acre/season was Rs. 8, 20, 000 from shrimp cultivation considering the average market price of Rs. 328 per kg of shrimp. The average annual return of Rs. 5, 82, 636 was received per acre/annum. Further for every rupee of investment in shrimp culture Rs.

1.55 was obtained as returns. Similar study "Economics of shrimp aquaculture and factors associated with shrimp aquaculture in Navsari District of Gujarat", was conducted by Navghan *et al*. (2015) [3]. They found black tiger shrimp farmers and white legged shrimp earned a net profit of 19.63 Lakh/ha/crop and of 5.57 Lakh/ha/crop respectively. The black tiger shrimp was less profitable (1.95) than white legged shrimp (3.01). The farmers contributed the largest share to profit and cost.

The results of the study indicates that shrimp (*L. vannamei)* is highly profitable business when compared to other crops cultivation. The sample respondents suggested that for the new entrants at least 2 years of continual shrimp farming should be practiced not bothering about the loss which would in turn fetch them higher returns.

Existing Marketing Channel in the Study Area

The shrimp marketing channel existed in Andhra Pradesh was identified and mapped in Figure 1. The actors involved in the channel were farmers, middlemen and processing cum export units asits stakeholders

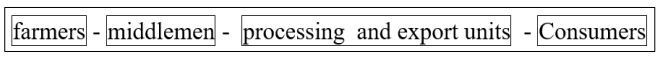

Fig 1: Marketing Channel of Shrimp (*L. vannamei*) in Andhra Pradesh

Actors involved in conducting various activities of supply chain. For conducting the activities, actors incurred particular costs and also reaped margins out of it.

Source: Primary Survey

Table 2: The details of various costs incurred, margins achieved by different stakeholders. (Rs/kg)

S. No.	Particulars		Channel	
			Price	Percentage
	Farmer			
1	Gross price received		328	48.81
2	Production cost		212	31.55
3	Net price received		116	17.26
	Middlemen			
4	Purchase price		328	48.81
5	Marketing cost			
	a	Transport charges	0.80	0.12
	b	Storage charges	0.27	0.04
	c	Labour charges	0.22	0.03
	d	Miscellaneous	0.16	0.02
	Total cost(a+b+c+d)		1.45	0.22
6	Sale price		350	52.08
7	Marketing margin		20.55	3.06

For calculating the price spread; the price paid for a kilogram of shrimp at the farm gate was taken as Rs. 328 and the final price paid by the consumer in the importing country was on an average Rs. 672. This range was being taken as a bench mark to determine the price spread across the channel. Since, there is no marketing activities at farmers' level there is no marketing cost and margin. The total marketing cost was worked out to Rs. 60.60/kg, out of which Rs. 1.45/kg is incurred at the middlemen level and Rs. 59.15/kg is incurred at the processing and export level. The marketing cost at the middlemen level included trans-included transportation charges which had the highest share of Rs. 0.8 per kg followed by storage charges (Rs. 0.27/kg), labour charges (Rs.0.22/kg) and miscellaneous charges (Rs. 0.16/kg).

Table 3: Price spread analysis of shrimp supply chain management in Nellore district of Andhra Pradesh

S.No.	Particulars		Channel	
			Price	Percentage
	Processing and export unit			
8	Purchase price		350	52.08
9	Marketing cost			
	a	Transportation charges	15.26	2.54
	b	Electricity cost charges	10.2	1.52
	c	Labour cost charges	3.7	0.55
	d	Processing charges (value addition)	7.37	1.10
	e	Storage cost charges	7.23	1.08
	f	Packaging cost charges	13.35	1.99
	g	Miscellaneous	2.04	0.30
		Total cost (a+b+c+d+e+f +g)	59.15	8.80
10	Sales price		600	89.29
11	Marketing margin		190.85	28.40
12	Price paid by the consumer		672	100.00
13	Price Spread		344	51.19

The marketing cost at the processing and export level included transportation charges which had the highest share with Rs. 15.26/kg, followed by packaging charges of Rs.13.35/kg. The other charge included electricity charge (Rs. 10.2), processing charge (Rs. 7.37), storage charge (Rs. 7.23) and labour charge with Rs. 3.7 per kilo gram. The total marketing margin was Rs.259.31/kg where the processing and export units had the major share with Rs. 240.85/kg and the middlemen with Rs. 1.45/kg. The farmer's share in consumer's rupee was 48.8 per cent.

Constraints Faced by Shrimp Farms

It is important to identify the major problems faced by the farmers in cultivating the shrimp farms to increase the market efficiency. In this regard, major constraints faced by the farmers were ranked using Garret's ranking technique.

Table 4: Constraints faced by the Shrimp Farms (n=80)

S.no.	Constraints	Garrett's score	Rank
1	Disease problem	82.00	I
2	Lack of availability of quality seed	81.00	II
3	High feed cost	70.00	III
4	Price fluctuations	63.00	IV
5	Power tariff cost	62.00	V
6	Poor water quality	60.00	VI
7	Feed quality and availability	59.00	VII
8	Lack of government support	58.00	VIII
9	Lack of credit and insurance	43.00	IX

It was inferred from the above table that disease problem (81.92) and lack of availability of quality seed (81.00) are the most important constraints faced by the sample respondents in the shrimp production. The other factors were high feed cost (69.59) and price fluctuations (62.24) were ranked III followed by power tariff cost (62.00), poor water quality (60.00), feed quality and availability (59.00), lack of Government support (58.00) and lack of credit and insurance (43.00) respectively.

Hence, the government have to take necessary steps to strengthen the R & D wing to produce distance free and high quality shrimp seed. It would enhance the expert business and compete in the global market. A part from that they need to start some testing labs with qualified staff for water, soil and shrimp testing.

Conclusion

The shrimp marketing channel existed in Andhra Pradesh was studied and identified Farmers, Middle men and Processing cum Export units asits stakeholders. The average gross return per acre/season was Rs. 8, 20, 000 from shrimp cultivation considering the average market price of Rs. 328 per kg of shrimp. The average annual return of Rs. 5, 82, 636 was received per acre/annum. Disease problem and lack of availability of quality seeds are the most important constraints faced by the respondents in the shrimp's production. The price spread indicated that the price spread was Rs.344 per kg of shrimp *(L. vannamei)*. Processing cum Exporters incurred maximum cost and also they received maximum margins from shrimp marketing. Farmers received only minimal amount in total amount paid by the consumers. The study also revealed that there is direct relationship in terms of proportions attributed to marketing margins and marketing cost with price spread. Major diseases (81.92) and lack of availability of quality seed (81.00) are the most important constraints faced by the sample respondents in the shrimp production. State government should take initiative for establishment of shrimp hatcheries for supplying good quality shrimp seeds

(post larvae) to the farmers for higher production rate. Disease diagnosis and treatment measures are to be simplified and popularized by the concerned state Fisheries Department and the Central Institute of Brackish water Aquaculture. So, that they could play a vital role in skill development among the shrimp farmers in disease diagnosis and treatment measures.

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