RESEARCH ARTICLE

FISH FARMING AND MARKETING SYSTEM IN BARA DISTRICT, NEPAL

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ARTICLE DETAILS	ABSTRACT

Bara district is one of the leading fish producing district of Nepal that lies in Madhesh Province in South-Central Nepal. Fish produced in Bara is marketed to distant markets along with the local market. However, the marketing system, actors in fish market and their benefits is studied too less. Thus, present study was carried out to understand and analyze the marketing system of fish produced in Bara district. The study was done by survey using questionnaire. A total of 76 farmers along with 30 traders were selected randomly for the survey. In present study area, mainly males (98.7%) were involved in fish farming with little involvement of females as entrepreneur. The major culture system followed is carp polyculture with some changes to produce huge volume of Chaddi. Chaddi fish includes the production and marketing of advanced fingerlings (30-50 g size) of Rohu and Mrigal. Different actors in fish marketing channel included farmer, wholesalers, and retailers. Altogether four different types of marketing channel were found in present study. Chaddi fish produced in study area is mainly exported to larger markets like Kathmandu, Pokhara, and Chitwan while local market is dominated by silver carp due to its comparatively lower price. Price of fish at different stages of market depends on size as well as fish species. The general trend was that, larger the fish higher price it fetches in market. Wholesalers get a profit of around 4-8% while retailers get about 9-16% profit, but due to dhalta system, the net profit is higher. According to dhalta system, farmers have to provide 30% more fish as compensation to traders as fish are weighed live. Traders were found to use different types of transportation media from pickup vans, motorbike as well as cycle. Some of the traders also use ice for the storage of surplus fish. Different constraints in fish marketing included low market price, dhalta system in trade, lack of structured market and storage facilities, transportation issue and Indian market dependence among which low market price is most prevalent problem.

KEYWORDS

1. INTRODUCTION

Aquaculture is one of the fastest growing agricultural subsectors in Nepal. The current total national fish production is 104,623 MT of which 25% is contributed by capture fisheries while 75% is from aquaculture. Fisheries sector contributes about 4.22% in Agricultural Gross Domestic Production and 1.59% in Gross Domestic Production respectively (CFPCC, 2021).

Marketing is the management process of the production chain from producer to final consumer (Kotler, 2000). In a properly functioning market, marketing channels have to guarantee that consumers can buy and that producers can sell their products at reasonable prices in the market place; they have to balance supply and demand in each market segment at any time (Hai, 2003). Marketing system includes reception, treatment, distribution and sales of fish which indeed increase the price of fish but are essential for supply of fresh and high-quality fish to the homes of consumers all over the country (Khanal et al., 2020). The fish marketing system of Nepal is unsystematic and not satisfactory (Husen, 2019). Irrespective of leading district in fish production marketing situation is becoming a serious obstacle due to inadequate market centers, poor transport facilities, poor infrastructure and lack of awareness towards intermediaries' margins. Fish marketing is characterized by heterogeneous nature of the product regarding species, size, weight, taste, keeping quality and price. Certain other problems in fish marketing include high perishable and bulkiness of material, high cost of storage and transportation, no guarantee of quality and quantity of commodity, low demand elasticity and high price spread (Ravindranath, 2008). Furthermore, lack of marketing infrastructure, transport facilities, lack of cold storage facilities and unsystematic and improper marketing are other major issues the fish industry is facing (Gautam, 2015).

Bara is located in the south-central part of Nepal and is being into an aquaculture hub with creasing trading activities of fish. It produces yield of 7,200 kg/ha (MoALD, 2021). The total number of ponds in Bara district is 4,477 and the total water surface area is 1616 Ha. (MoALD, 2021).Fish is one of the major products being traded in Bara commodity market. An effective marketing system is needed to make fish available to consumers at the right time and in the right place (Bahadur, 2004). This study aims to explain the existing production and marketing systems of fish in fish block of Bara. If the awareness regarding marketing of fish can be raised among Fish producers, the marketing channel can be managed and this district will be self-reliance in aquaculture. The findings of this study will be useful for planners, policy makers, project implementers, farmers and donors to formulate policy, strategy and plan.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in eight different local levels of Bara district of Madhesh Province. Commercial fish farmers were considered as the survey population and thus included in sampling. A total of 76 farmers from the total 302 fish farmers of fish block, Bara was selected by using Yamane's formula on the basis of quota sampling. Similarly, Fish traders (wholesalers, retailers) from the Fish super zone, Bara was selected by random sampling method from the sampling frame.10 wholesalers and 20 retailers was selected on basis of simple random sampling. The study was undertaken for 3 months from March to May in 2022.

2.2 Data Collection

Primary data was collected from the semi structured pretested interview schedule, Focus group discussion (FGD) and Key informant interview (KII). FGD was conducted in a group of 10 progressive farmers during preparation of checklist and KII was conducted with the representative of local stakeholders, lead farmers. Extension workers for cross examination of data Other extra information was also be collected through observation and discussions. The sources of secondary data were MAOLD, CBS, related documents, publications and research paper, etc.

2.3 Data Analysis Techniques

Qualitative and quantitative analysis was done using MS Excel and SPSS. Indexing was used in the ranking of fish marketing problems.

Index was calculated using following formula:

$$I_{prob} = \sum \frac{S_i f_i}{N}$$

Where,

I_{prob} = Index value for intensity

S_i = Scale value of ith intensity (I =1, 0.8, 0.6, 0.4, 0.2)

F_i = Frequency of ith response

N = Total number of respondents

On the basis of ranking of each problem by the individual respondent final index value was Obtained which showed the severity of marketing problems.

3. RESULTS AND DISCUSSION

3.1 Socio Demographic Characters

Gender distribution of famers showed that mainly males (98.7%) were involved in fish farming. Only one (1.3%) of respondents was found as an active female fish entrepreneur. Similarly, the traders were also mainly male (96.6%) with little involvement of females (3.4). Women in rural regions of Nepal lack the required time for participating in aquaculture activities because of their engagement in many household activities (Gupta , 2022). Similarly, the age distribution of farmers showed that farmers aged between 31 and 50 were dominant. However, there were some young entrepreneurs as well as experienced farmers also involved (Table 1). In case of wholesalers, it was dominated by economically active group aged between 31 and 50 with some young ones too involved. The scenario was same in case of retailers too. The age distribution data of Bara district shows that age group of 30-55 prevails the population (CBS, 2011).

Table 1: Socio demographic characters of Respondents, 2022							
Age group	11 to 20	21 to 30	31 to 40	41 to 50	51 to 60	> 60	Literacy level
Farmers	-	9.2	35.5	42.1	7.9	5.3	92.11%
Wholesalers	-	10	30	60	-	-	90%
Retailers	5	20	40	25	5	-	60%

The education level of farmers was found to vary between illiterate up to university level. The wholesalers have higher proportion of respondents having no formal education, which is further higher in case of retailers. The district profile data shows that 55% proportion of the population in Bara is illiterate (CBS, 2011). However, the majority of respondents in present study were male, thus the literacy may be higher compared to district profile.

3.2 Fish Farming Practices

The respondent farmers were found to culture major Carp species which includes both Indigenous carp species (Rohu, Mrigal and Catla) and Exotic carp species (Common carp, Silver carp, Bighead carp and Grass carp. But, the prevailing culture technique in Bara is Chaddi production which is also reported by previous studies (Gupta et al., 2019). Chaddi culture system means the production of small sized (< 50 g) Mrigal fish (with some proportion of Rohu too) mainly targeted for party palaces, hotels and restaurants.

Figure 1: Proportion of seed of different fish species stocked in pond, 2022

As the Chaddi production is mostly practiced in the study area, the main species to be cultured was found to be Mrigal. The total production of fish in the study area was calculated to be 1203.9 Mt among which Chaddi has the highest production accounting for about 708.9 Mt. The proportion of different fish species seed stocked in study area is shown in Figure 1. The total area of ponds as reported by respondent farmers was 253.3 Ha, thus, the average productivity in the study area was found to be 4.75 Mt/Ha. It is evident that Mrigal and Rohu fingerlings are stocked in high quantity for the production of Chaddi fish. Some of the Rohu are left behind in ponds to grow to large sized table fish while all of the Mrigal are harvested as Chaddi fish. Mrigal is stocked and harvested more than two times from the ponds as they take short time to grow to the desired size. The calculated productivity in the study area is lower than provided in the statistical information of district, 7200kg/ha (MoALD, 2021), which might be due to the study with the sample size.

3.3 Fish Marketing

Out of total 1203.9 Mt total production, only about 1% (12.5 Mt) is consumed by the farmer's households while rest is marketed. Thus, the total marketed fish comes to be about 1191.4 Mt. These fish are marketed through different channels in different markets including the local market to the distant markets in major cities of Nepal as well as to some Indian markets.
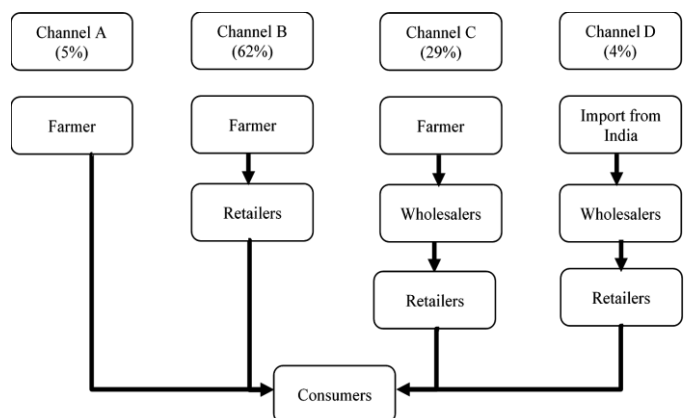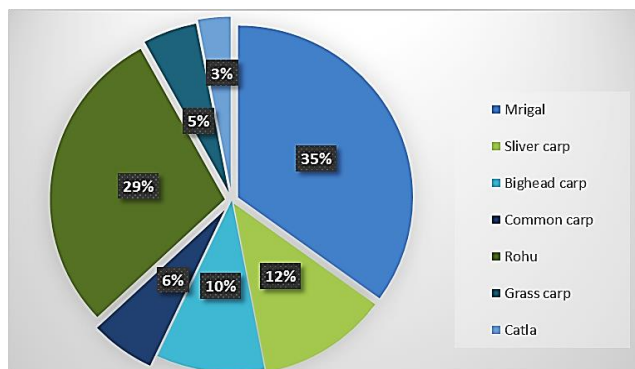
3.4 Marketing Channels

Figure 2: Different fish marketing channels in the study area, 2022

Farmers were found to adapt different marketing channels to sell their fish. Farmers were found to be more comfortable to sell their fish to wholesalers, as the volume of fish during harvest is high in volume. However, some of the fish are sold to retailers as well as directly to the consumers visiting the ponds during harvest. Similarly, some of the wholesalers were also found to import fish from India to sell in local market via retailers. Farmers themselves either sell their fish from the production site or send it to local markets. In case of huge production, fish is generally marketed through contractors (Mishra & Kunwar, 2014; Karki, 2016).

The proportion of fish marketed via different channels is shown in Figure 2.

3.5 Fish Species in The Local Market

Survey revealed that all retailers sold all seven cultured fish species in Bara but trading of all the species at one particular time/ day may not happen. This is because of the harvesting of a particular fish by farmers at a time. Which type of fish, farmer is harvesting at a particular time that particular fish is taken by the retailers and sold to consumers at market. Silver carp is most preferred by the consumers followed by Bighead carp, Rohu, Grass carp, common carp, Mrigal and Catla. Due to the price constraint Catla is less preferred by the consumer. Almost all of the Mrigal are produced in form of Chaddi but they were too observed in the market as table fish.

Survey shows all of the silver carp and bighead carp were sold but about 5-10% of common carp, Rohu and Grass carp respectively were unsold. More over 15-20% of Mrigal and Catla respectively was unsold. Chaddi is not preferred at all by the local market and people. Almost all of the Chaddi is exported to the larger markets of mid hills like Kathmandu, Pokhara, and Bharatpur etc. The demand of Chaddi has been increasing day-by-day thus the adoption rate of Chaddi production system is also rising (Adhikari et al., 2019)

3.6 Price of the Fish Species

The price of different fish was found to be size dependent. Fish are categorized in three sizes, viz. < 1 kg, ~ 1 kg and >1 kg and they fetch different price increasing according to size. The farm gate price of different fish species according to size is shown in Figure 3. Farmers reported that although there was vast increase in the price of inputs like feed, fertilizer and labor cost, the price of fish has been constant since last 5 years. From the figure it is evident that larger the size of fish is, more price it will fetch. The price of Mrigal fish was lowest among all other fish. A study in Dhanusha showed that price of table fish is higher than the Chaddi fish (Koirala et al., 2021). A study in Bara district reveals the price of Chaddi is increasing but at a very slow rate (Gupta et al., 2019).
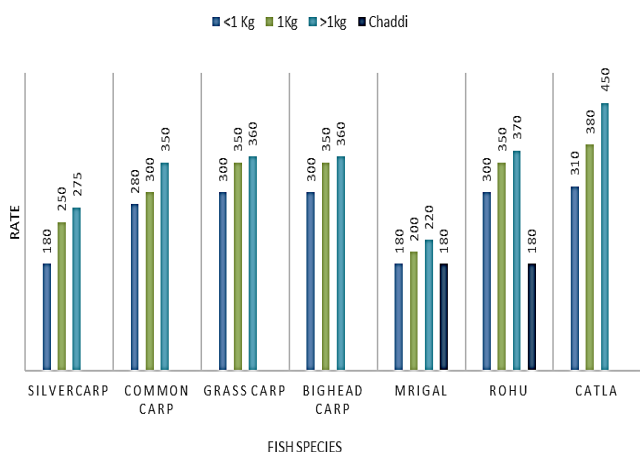

Figure 3: Farmer gate price of cultured fishes, 2022

Wholesalers buy fish in bulk directly from farmers and sell to retailers or to distant markets. Selling price of wholesalers was found to be about 4-8% higher than farm gate price for different fish species. In addition to that, study clearly shows that due to the perishable nature of the product, farmers have to provide 30% more fish to the wholesalers or retailers which is known as 'dhalta system'. Dhalta system is considered as compensation as fish are weighed wet (with some water) and live that may lose some weight till marketing. Thus, together with 30% added product and 4-8% direct profit margin, there seems to be more than 25% net profit to wholesalers. Figure 4 shows the price of fish based on size and species as sold by wholesalers.
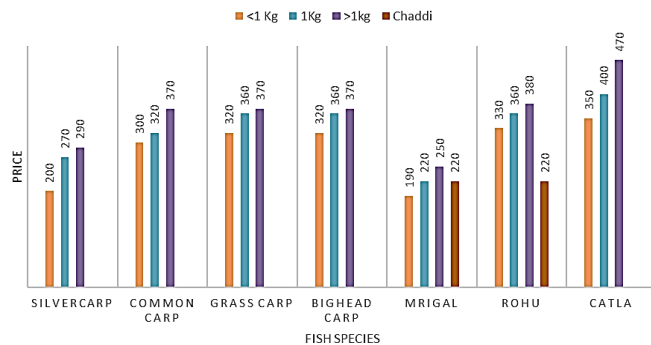

Figure 4: Wholesale price of fishes, 2022

The retail price of all fish was found to be about 3-7% higher than wholesale price. However, if retailer sell fish directly buying from farmer, they get about 9-16% profit. Along with that, when directly buying from farmers, they also get dhalta, thus making profit around 40%. The retail price of different fish is shown in Figure 5.
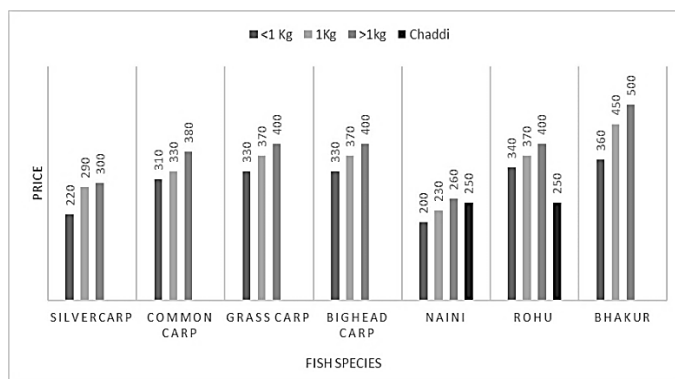

Figure 5: Retailers price of fishes, 2022

The average farm gate Price, wholesale price and retail price of fish species was found to be NRs. 292.30/Kg, NRs.311.92/Kg and NRs. 340/kg (Koirala et al., 2021).

Seasonal fluctuation in the price of fish was also recorded during present study. Respondents reported that demand of fish in market is low during summer as compared to winter and thus fish fetches around 15-20% more price in winter compared to summer. Higher fish demand is in winter while least fish consumption is found in Asadh, Shrawan and Bhadra (Kunwar and Adhikari, 2017).

3.7 Means of Transportation for Carrying Fish

Traders used different available means for transportation like cycle, motorbike and pickup vans. Mostly retailers were seen with cycle and motorbike for carrying fish to the local market while pickup vans was used for carrying larger amount of fish by Wholesalers. Due to short distance between production and marketing sites, majority of retailers use motorcycle and cycle for fish transport in crates and metal pots. As per the survey conducted, it was found that all of the retailers either use cycle (40%) or motorbike (60%) for transport of fish whereas all of the wholesalers used pickup van installed with tanks for transporting large amount of fish. A research in Kaski reveals for the local market, transportation of live fish was in the hundies (traditional pots or plastic or metal pots) with water. For the distant market, transportation of live fish was done in the plastic tank capacity of 200-250 liter water loaded on the truck. While other unprocessed wet fish are packed in container like plastic crate or iced fish in bamboo basket lining with protective layers of leaves (Husen, 2004).

3.8 Storage Adoption

Research revealed that majority of the retailer's only trade the amount of fish that they were sure to be sold in the market. Even at the bad times they cut off the price and sold out the fish as quick as possible. The last option for the unsold fish was to store in the ice for next day trade. Retailers were found to perform trade for only next day (ice storage Fish). Another extra day was not taken in account as storing in ice badly degrade quality of fish and its marketing value. Study encased that 80% Retailers did not prefer any storage mechanism as there fish used to get all sold out. Remaining 20% prefer ice storage as to conserve fish for next day trade.

Even if by all those techniques fish remained unsold on the next day, then retailers were seen dumping the fish. Retailers said that a certain type of fish consumes dump fishes and also they were found burying unsold fishes in the land. A research in Chitwan stated that storage of fish was mainly carried out by most of the traders in ice. Few of wholesalers and majority of retailers functioning in Chitwan use ice as a mechanism of fish storage (Wagle et al., 2017). In Dhanusha, Nepal 53.84% of traders didn't use any storage mechanism. 38.47% of the farmers were found to use Ice as storage medium and only 7.69% farmers were found to use refrigerator as storage medium (Koirala et al., 2021).

3.9 Import and Export Status in Bara

As the study revealed that 1203.87MT fish is produced in Bara district. Chaddi is the main output of the district which is almost all exported to other districts. About 62% of the total production is exported outside of the district which mainly consist of Chaddi. Export is mostly done to major cities of Nepal. Major cities are Kathmandu, Pokhara, Hetauda and other districts of East. 20% of the product remain in the local market and remaining 18% goes to India. Because of small local market, only 20% of its production stays here.

Traders said Chaddi is greatly preferred by midhills consumers and Rohu is major export to India. Most of the silver fish stays in the local market as they are more preferred by local consumers due to its economical price. Silver fish is not that much exported and preferred by other districts consumer.

Generally, Bara district accompanies its production of its own and does not need extra amount of fish to equalize demand of fish. But during winter there was found to be import from India production sites as price would been high in winter. Due to loose border traders would escape customs at border to cut off tax and illegally import fish to get higher price at winter season in Nepal. In fiscal year 2015/16, domestic production occupied 90% and imported fish occupied 10% of the total national fish consumption (Kunwar and Adhikari, 2017). A total of 10957.3 Mt of table fish was imported in Nepal, whereas a total of 61.2 Mt of table fish is reported to be exported from Nepal to India (Ranjan, 2019). Import and Export value of Fish and crustaceans, mollusks and other aquatic invertebrates NPR 1,765,136,000 and 3, 34,000 respectively (FTD, 2020).

3.10 Constraints of Fish Marketing

As per the study conducted, low market price was found to be ranked as the main problem with index 0.9 followed by Dhalta system in trade as second with index value 0.83. Similarly lack of structured market and storage facilities was ranked third with index value of 0.69 a transportation issue was ranked four with index value 0.36. Likewise, Indian market dependent was ranked last with index value 0.25. In contrast, Dhalta to be given (the amount is given to the buyer in addition to the actual amount bought) was identified to be the first major constraint in the marketing and markets as ranked by the carp producer in the study area with an index value of 0.91 (Bhandari, et al., 2021). In Nepal, most serious marketing problems are lack of transportation, fish diseases, lack of financial facilities, frequent strikes, fish theft, lack of research about fish marketing, unhygienic storing condition, lack of specialized fish marketing manpower and lack of adequate marketing infrastructure (Kumari, 2015; Budhathoki and Sapkota, 2018).

Table 2: Constraints of Fish Marketing, 2022

Problem	Index	Ranking
Low market price	0.9	I
Dhalta system in trade	0.83	II
Lack of structured market and storage facilities	0.69	III
Transportation issue	0.36	IV
Indian market dependence	0.25	V

4. CONCLUSION

Fish farming is major agricultural sector in Bara district providing employment to large number of individuals. With great support and technical support, fish farming could be very reliable source of income and has greater potential. Although the grater potentiality, farmers and traders in Bara are tackling with different issues with regard to marketing. Therefore, factors affecting the situation should be analyzed. This will definitely help to increase the economic return and uplift the national aquaculture scenario.

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