**Assessment of Commercial Fish Feed Usage and Market Access Among Fish Farmers in Manipur, India**

**ABSTRACT**

**Fish feed constitutes the largest share of operational costs often up to 60 % in aquaculture and plays a very important role in determining the overall growth, health, and productivity of cultured fish. A structured questionnaire-based survey was conducted among 50 fish farmers across five districts of Manipur namely Imphal East, Imphal West, Thoubal, Kakching, and Bishnupur to assess the availability, pricing, and usage of commercial fish feed. The study aimed to understand feed preferences, access to subsidies, and supply-related challenges. This study showed that only 20% of respondents reported easy availability of commercial feed, while 88% noted price hikes due to economic disruptions. A majority of farmers preferred high-protein feeds (28–30%) and floating feed types, mainly for Indian Major Carps. Only 8% reported receiving subsidized feed. The findings highlight limited feed access in remote areas, inadequate policy outreach, and pricing challenges. The study suggests improving distribution infrastructure, increasing subsidy awareness, and promoting locally produced, cost-effective feed alternatives to support sustainable aquaculture in the region.**

**Keywords: Commercial fish feed, Aquaculture, Feed accessibility, Floating feed, Protein content**

### ****INTRODUCTION****

Aquaculture sector in India has seen rapid growth over the last few decades, driven by the increasing demand for animal protein and the economic viability of fish farming (FAO, 2020). Among the main inputs in aquaculture, fish feed constitutes the largest share of operational costs often more than 50 % and plays a very important role in determining the overall growth, health, and productivity of cultured fish (Meetei et al., 2025; Khangembam et al., 2025; Tacon & Metian, 2008). The increasing adoption of commercial pelleted fish feeds, mainly in freshwater aquaculture, reflects a shift from extensive to more semi-intensive and intensive farming practices, with a preference for feeds with standardized and well balanced nutritional profiles, such as 22 to 40 % crude protein content, to meet the species-specific dietary requirements (Tacon, 1987).

In northeast India, and mainly in Manipur, aquaculture serves as a major livelihood source for small and marginal scale farmers. However, the accessibility, availability, affordability, consistency and quality of commercial fish feed remains a major concern. Several challenges including price fluctuations, unequal distribution of feeds, lack of subsidy awareness, and disruptions caused by socio-political events like economic blockades or general strikes in Manipur often hinder the availability and affordability of the commercial feed access in both urban and rural areas of Manipur ( Devi et al., 2012a; Devi et al., 2012b).

In order to have a comprehensive understanding of the challenges associated with commercial fish feed usage and to capture the perspectives of fish farmers, a survey was designed and implemented across five major fish-producing districts of Manipur namely Imphal East, Imphal West, Thoubal, Kakching, and Bishnupur. These districts were selected based on their active engagement in aquaculture and fisheries, which allowed for a better representation of farmer experiences. The main objective of the study was to assess the current availability and distribution of commercial pelleted fish feeds (floating and sinking feeds) in local markets, pricing patterns, and identify the commonly used feed types (floating and sinking feeds) and protein content levels. This grassroots-level approach provided better insights into the socio-economic and logistical constraints shaping feed access in Manipur and helped identify gaps in policy implementation and resource availability within Manipur’s aquaculture sector.

**MATERIALS AND METHODS**

This study was conducted to assess the current use, accessibility, and market dynamics of commercial fish feed among fish farmers in five key districts of Manipur: Imphal East, Imphal West, Thoubal, Kakching, and Bishnupur. A structured questionnaire was specifically set for research purposes to collect data on the availability, pricing, and types of commercial fish feed used by fish farmers, as well as to document socioeconomic factors such as age, gender, education, income, and language proficiency of the respondents. Participants were informed about the purpose of the research and was required to give voluntary consent to participate before beginning the survey. Respondents were asked to acknowledge that their participation was voluntary, that they were at least 18 years of age, and that they could withdraw from the survey at any point. Only those who agreed to these conditions were included in the study.

Data collection was carried out through direct, face-to-face interviews using printed questionnaires. The questionnaire included questions covering several aspects such as the availability of commercial fish feed in local and remote markets, impact of economic blockades or general strikes on feed prices, availability of subsidized feed, and preferences in terms of protein content (20%, 22%, 28%, or 30%). The survey also recorded the typical market price per kilogram of feed across different regions (ranging from ₹60 to ₹80), the types of fish species being fed (Indian Major Carps, Exotic carps, catfish, or all), and the types of feed used (floating or sinking). A purposive sampling method was employed to select active fish farmers from each district, ensuring representation across diverse age groups and socioeconomic backgrounds.

The data analysis of the surveys includes both qualitative and quantitative assessment. The collected data were then compiled and analysed to generate descriptive statistics such as frequencies and percentages which provided insight into the commercial feed preferences and market conditions experienced by local fish farmers across the five selected districts of Manipur.

**RESULTS**

A comprehensive field survey was conducted during the month of February to March 2024 across 5 districts of Manipur, viz., Imphal East, Imphal West, Bishnupur, Thoubal and Kakching, to assess the status of commercial fish feed availability, feed usage, pricing, associated challenges faced by the farmers and other socio-economic related indicators. The survey was conducted in a population consisting of 50 farmers, of which 40 were males (80%) and 10 females (20%) (Fig. 1), indicating a clear gender disparity where male farmers show predominance in fish farming activities across the 5 surveyed districts. In terms of demographic context, the highest respondents are from the Bishnupur district (15), reflecting its abundance of large water and developed aquaculture facilities, followed by Imphal West (10), Thoubal (10), Kakching (10) and Imphal East (5). (Fig. 2). In terms of educational qualification, 30% of the farmers had completed up to the 10th grade, 30% of farmers were educated up to higher secondary (10+2), 20 farmers were graduates; however, 20% of farmers were educated only up to the 5th grade (Fig. 3).

To evaluate the market supply and socioeconomic constraints, the farmers were asked about the availability of commercial feed in the targeted regions. 80% of the farmers reported scarcity, while 20% farmers reported affirmatively that the commercial feed was available abundantly. The issue was different in remote areas, where 80% of farmers reported limited access, which highlights the lack of a supply chain in remote areas. Again, 88% of farmers affirmed that the prices of commercial fish feeds were severely affected by the vulnerable economic crisis in the state, acting as barriers to aquaculture development. Furthermore, only 8% of the farmers have access to subsidized rates, while 92% of the farmers have never acquired such benefits, reflecting a significant outreach deficit and lack of organisational/institutional assistance (Fig. 4).

Regarding the protein content, which is a vital component in formulated fish feeds, 40% of the farmers rely on commercial feeds with 30% crude protein, 30% of farmers used 28%, 20% of farmers used 22%, and only 10% rely on feed with 20% crude protein (Fig. 5). These findings highlight the lack of knowledge regarding the importance of protein content in fish feeds, especially in intensive farming. The survey findings also reflected a significant sensitivity and high heterogeneity to feed price, with the majority of the farmers (40%) purchasing feed @ Rs. 70-75/- per kg, 10% of the farmers bought @ Rs 60/- per kg and another 10% of farmers acquire feeds @ Rs 80/- per kg (Fig 6). These might be attributed to variations in transportation costs across different regions, flaws in the supply chain, or inconsistent dealer margins. As feed expenses account for up to 60-70% of the total aquaculture feed development costs, these fluctuations in pricing might have significant implications on both profitability and sustainability in feed enterprises.

Moreover, regarding cultured fish species and feed types, commercial fish feeds were significantly employed for Indian Major Carps (IMCs), with 60% of the farmers are in this category. A smaller fraction of the farmers (6-10%) utilized the commercial feed for exotic carps and catfish, while 24% of the farmers utilized commercial feed for all three types, i.e., IMCs, exotic carps and catfish (Fig. 7). Floating feeds, which are considered superior for intensive culture, were preferred by 60% farmers. Floating feeds are costlier and not feasible for the remaining 20% of the farmers (Fig. 8).

Fig. 2. Demographic context of the five districts

Fig. 1. Gender distribution

Fig. 3. Level of education

Fig. 4. Availability of commercial feed in the targeted districts

Fig. 5. Feed protein content

Fig. 6. Commercial feed market price

Fig. 7. Types of fish culture in the selected districts

Fig. 8. Types of feed used by the farmers

### ****DISCUSSION****

This study underscore the critical challenges faced by fish farmers in Manipur with regard to the availability, affordability, and distribution of commercial fish feeds. A major observation was that only 20% of the respondents reported abundant availability of commercial fish feed in their local markets, while the majority (80%) expressed difficulty in accessing such feeds. This aligns with the concerns previously documented in the region, where logistical bottlenecks, inadequate infrastructure, and inconsistent market supply chains significantly limit access to quality aqua-feeds (Das et al., 2024). Interestingly, most farmers showed a clear preference for high-protein feeds, with 40% using 30% protein content and another 30% using 28%. This preference may be attributed to a practical understanding among farmers of the relationship between higher protein levels and improved fish growth performance, especially in carp-based polyculture systems (Tacon, 1987). Despite this awareness, protein-rich feeds are typically more expensive, further exacerbating financial constraints for farmers operating with limited budgets and limited support. In terms of pricing, the majority of farmers paid between ₹70–75 per kilogram, indicating some regional pricing variability. While prices remain relatively stable in certain districts, remote and underserved areas likely face inflated costs due to additional transportation burdens, a trend previously noted in supply chain assessments for northeast India (Das et. al., 2024; Hazarika et al., 2021).

Species preference patterns observed in the study where more than 50 % of farmers primarily used commercial feed for carps reflect the dominance of carp-based farming in Manipur. The relatively lower adoption for catfish and exotic carps may be linked to species-specific feed requirements, market demand, and limited farmer access to technical know-how for diversified culture systems (Meetei et al., 2025). Furthermore, the preference for floating feed over sinking feed is consistent with trends seen across India and Southeast Asia, where floating feeds are favoured for their ease of monitoring, reduced waste, and better feed conversion ratios (Meetei et al., 2025; Tacon & Metian, 2008). Floating feed also allows farmers to visually track feeding behavior and fish health, which is especially beneficial in small-scale, manually operated farms. Overall, the survey highlights critical gaps in aqua-feed accessibility, policy dissemination, and infrastructural support in Manipur. The findings suggest an urgent need for decentralized feed storage hubs, improved logistics during disruptions, targeted farmer training programs, and expansion of government subsidy schemes to bridge the rural-urban divide in feed accessibility. The development of locally formulated, low-cost feeds using non-conventional resources such as molluscan and crustacean by-products already under exploration in Manipur (Meetei et al., 2025; Khangembam et al., 2025) could offer a sustainable alternative to reduce dependency on commercial brands.

### ****CONCLUSION****

The survey conducted across five districts of Manipur revealed that while commercial pelletized fish feed is very important to aquaculture development, however, its availability and affordability remains a major issues. Overall, these findings showcase that a small segment of the fish farming community in Manipur started adopting nutritionally balanced feeds, but some farmers are still facing significant challenges to feed accessibility, economic vulnerability, fluctuating market values and various subsidies mechanisms. This study also highlight the disparities in feed availability and price fluctuations across various districts and between rural and urban areas, which need immediate action for decentralised distribution networks through government or institutional assistance. Furthermore, farmer awareness is also needed to enhance farmer’s knowledge of the nutritional requirements of formulated feeds and optimum feeding strategies.

### ****REFERENCES****

Das, P., Hussain, I., & Rudra, V. (2024). An overview of growth and future prospects of fish farming in the North-East India. *Journal of Livestock Science*, *15*(15).

Devi, N. B. L., Sheela, I., Ngangbam, A. K., & Ananthan, P. S. (2012). Study of fishers’ socioeconomic and cultural profile around the Loktak lake of Manipur, India. *Journal of Agriculture and Veterinary Science*, *1*(5), 48-56.

Devi, N. B. L., Ngangbam, A. K., & Sheela, I. (2012). A study on existing fisheries management system and the problems faced by the fishers in Loktak Lake of Manipur. *Journal of Agriculture and Veterinary Science*, *1*(5), 22-28.

FAO (2020). The State of World fisheries and aquaculture. Food and Agriculture Organization (FAO).

Hazarika, B. B., Saikia, D. D., Nath, A. K., Hazarika, M., & Sultana, S. (2021). Exploring The Status Of Aquaculture In Assam-Problems And Prospects: A Descriptive Study. *Int. J. of Aquatic Science,* 12(3), 1877-1887.

Meetei, K. B., Nongmaithem, B. D., & Ngangbam, A. K. (2025). Aquafeed Innovation: Utilization of Molluscan and Crustacean By-Products for Sustainable Fish Nutrition. *Journal of Experimental Agriculture International*, *47*(3), 349-356.

Khangembam Brajamani Meetei, Bijayalakshmi Devi Nongmaithem, and Ajit Kumar Ngangbam (2025). Nonconventional Feed Resources for Sustainable Aquaculture: A Review. Biological Forum, 17(3): 73-77.

Tacon, A. G. (1987). The nutrition and feeding of farmed fish and shrimp; a training manual. 2: Nutrient sources and composition.

Tacon, A. G., & Metian, M. (2015). Feed matters: Satisfying the feed demand of aquaculture. Reviews in Fisheries Science & Aquaculture, 23(1), 1-10