

Carp culture with farm made feed

– A success story

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The fisheries sector plays an important role in the socio-economic development of the country, which envisages livelihood, nutritional security, employment generation and export earnings. Feed cost is considered as the major recurring expenditure in aquaculture where feed alone amounts to 60% of total fish production cost. Commercial feeds for carp culture are available in the markets but small fish farmers are unable to use this feed because of its high cost. Traditional practice for fish farmers is to use mixture of groundnut oilcake and rice bran or cereals as fish feed. Recently the prices of both the ingredients have increased and farmers are unable to afford to feed the stocked fish.

Key words: Farm made fish feed, Feed cost, Fish feeds

THE Indian Council of Agricultural Research initiated a flagship network outreach programme on fish feeds among ICAR-CIFA, Bhubaneswar; ICAR-CIFRI, Barrackpore; ICAR-CIBA, Chennai; ICAR-CMFRI, Kochi; ICAR-DCFR, Bhimtal and ICAR-CIFE, Mumbai. The programme was undertaken to create awareness among the fish farmers across the country on the use of farm made fish feeds to increase the fish production, productivity and popularization of fish culture in the rural area supporting their livelihood. Being the network leader the ICAR-CIFA undertook several farmers' awareness programmes on fish feed, hands on training on farm feed preparation and feeding demonstration in farmers' ponds in Odisha, West Bengal and Karnataka. Use of farm made feed, with locally available cheap and unconventional feed ingredients, in rural

aquacultures, opened a new era for feed based aquaculture. Linseed sludge, a by-product of oil milling industry is rich in omega-3 fatty acid, was used in farm made feed for carp culture. A feed demonstration programme in aquaculture was undertaken in the ponds, at Ramkrishna Mission, Belur Math, West Bengal, with a view to use the locally available feed ingredients for the production of omega-3 fatty acid enriched fish.

The objectives were to create awareness on farm made fish feed

preparation and its utilization to enhance fish production; give hands-on-training on preparation and storage of low cost farm made feed using locally available ingredients; give demonstration of carp polyculture with farm made feed through participatory approach; and train the vocational trainees of RKM Samaj Sevak Shikshan Mandir through learning by doing mode.

Fish maintenance and feeding: Under the Outreach Activity on Fish Feeds, two ponds were engaged at Rama Krishna Mission, Belur Math, Howrah, West Bengal to provide hands-on- training to 30 trainees of Samaj Sevak Sikshan Mandir (SSSM) on farm made feed. The trainees represented 20 districts of West Bengal. Selected ponds were (i) 0.1 ha at Shilpamandira (Feed 1) and (ii) 0.08 ha at SSSM (Feed 2) under the Sarada Pith unit of Belur Math. Both the ponds were



Table 1. Feed formulations and proximate composition (% DM basis)

Ingredients	Feed 1	Feed 2
Til oilcake	60	—
Mustard oilcake	—	60
Rice bran	30	30
Linseed sludge	10	10
	100	100
<i>Proximate composition</i>		
Dry matter	97.70	97.80
Crude protein	26.32	25.26
Crude fat	4.61	5.20
Ash	17.78	18.02

stocked with rohu and catla juveniles @ 4,500 nos fish/ha at the respective ratio of 90 : 10 (90% rohu and 10% catla). The stocking size of rohu was 80-90 g and of catla 220-245 g.

Locally available low cost feed ingredients were identified; procured and feeds were prepared at the pond site. Two mash feeds were prepared using rice bran, til oilcake, mustard oilcake and linseed sludge in different proportions for feeding the fish (Table 1). Feed 1 was prepared with incorporation of til oilcake as the protein ingredient, and in Feed 2 mustard oilcake was used in place of til oilcake. Linseed sludge and other ingredients were similar in both feeds. Suitable feed dispensing mechanism were also developed, for which nylon bags were suspended on galvanized wire and connected by a small-pulley so that feed can be provided regularly, without entering into the water. Fish were fed twice daily at a feeding rate of 2% of their body weight, for 8-month culture period. Daily offering of feed was increased with increase of body weight of fish, determined from sampling, so as to maintain the uniform feeding rate of 2% of the body weight throughout the culture period. Monthly sampling of fish was

Table 2. Hydro biological parameters of ponds with different feed treatments

Particulars	Feed 1	Feed 2
Temperature	21-29°C	22-30°C
pH	7.5-7.8	7.4-7.6
CO ₂ (ppm)	6-8	4-6
Total alkalinity (ppm)	150-160	130-140
Dissolved oxygen (ppm)	6-8	6-8.5

done to assess the growth and health status of fish. Regular racking in ponds was practiced to release the obnoxious gases from the pond bottom due to accumulation of metabolites.

The composition (% DM basis) of linseed sludge were 4.4% crude protein, 19.00% fat and 40.83 % ash. The polyunsaturated fatty acid of linseed sludge was 73.76, where linolenic acid was predominant PUFA.

The water quality parameters are presented in Table 2. The water temperature ranged from 21-30°C in two ponds during the culture period. The pH, CO₂, total alkalinity and dissolved oxygen ranges from 7.4 to 7.8, 4-8 (mg/L), 130-160 (mg/L) and 6-8.5 (mg/L) in two different ponds respectively. The water quality parameters were suitable for fish production.

The fish production performance of different ponds are presented in Table 3. The final average weight of catla and rohu was 1.61 kg and 1.07 kg, respectively, in fish fed til oilcake containing feed (Feed 1) whereas respective average weight of catla and rohu in the pond of SSSM (Feed 2) was recorded as 2.20 and 1.51 kg, respectively. Survival rate of fish were 88-94%. The final fish biomass harvest from Shilpamandira (Feed 1) was 536.30 kg against 586.04 kg in the pond of SSSM (Feed 2), the net weight gain (kg) being 486.44 kg and 544.85 kg, respectively. The demonstration resulted in net production rate of 4.9 and 6.8 tonnes fish/ha/8 months, respectively, in Feed 1 and 2. At the end of the

Table 3. Fish production in two ponds at Belur math fed with farm made feed

Particulars	Feed 1	Feed 2
Pond size (ha)	0.1	0.08
Net biomass gain (kg)	486.44	544.85
Total feed intake (kg/8 months)	880.0	878
FCR	1.8	1.6
SGR (%/d)	1.01	1.13
Net production rate (t/ha/8 months)	4.9	6.8
Feed cost (₹)/kg	15.70	18.70
Feed cost (₹)/kg fish production	28.26	29.92

demonstration the trainees of RKMSSSM developed self confidence to adopt aquaculture practice as one of the avenues to upgrade their livelihood status and scope for self-reliance as well.

The PUFA content of fish ranged from 21.38 to 22.86 % of total fatty acids in their body. The predominant fatty acids were linolenic, linoleic, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). The EPA and DHA content of fish ranged from 0.06 to 2.35 % and 0.89 to 3.54% respectively, of the total fatty acids. This indicated that the fish reared on farm made feed containing lin seed oil mill sludge tailored the fatty acid profile of the harvested fish. The feed costs were substantially reduced by using mustard oilcake, til oilcake, rice bran and incorporation of linseed sludge, a low cost ingredient. The feed cost for production of each kg of fish was ₹ 29.92/kg when fed Feed 1 and the production cost on feeding Feed 2 was ₹ 28.26/kg.

Factors contributing to success

- Confidence and determination of the trainees to achieve the goal.
- Technical support of CIFA-Outreach activity on fish feed to re-establish the proven technology of carp culture at Ramakrishna Mission, Belurmath Ponds.
- Input support for the demonstration programme under outreach project in fish feed.
- Awareness campaign and hands-on training on farm made feeds. Collective efforts of the trainees by participatory as well as learning by doing approach.

Innovations/technology /management methodology

- Use of stunted fingerlings of rohu and catla fingerlings in the demonstration ponds, as seed input.
- Use of fermented organic manure and fertilizer to increase pond fertility.
- Use of feed bags in different places of pond so as to facilitate uniform feeding by all the fish in ponds.
- The bags were hooked with a pulley and fitted to a wire net, with such





Fish harvested from Shilpamandira pond



At pond site with the trainees of RKM Samaj Sevak Sikshan Mandir, Belur Math

intervention, the feeding bag can go deep into the pond to facilitate fish to take feed in a better way.

Lessons learnt

- The success story of trainees of RKMSSSM Belur Math, motivated other farmers to take up carp culture.
- To get better production from aquaculture in rural pond there is need of formulated feed along with natural productivity of the pond.
- Farm made feed is an alternative to the costly groundnut cake or commercial fish feed.
- Mustard oilcake and til oilcake can be used as protein source in fish feed.
- Linseed oil mill sludge, an oil industry byproduct was used as an ingredient to enhance PUFA content of feed and subsequently in carp muscle.
- Non-conventional feed ingredients, which is available plenty at reasonable price in the locality reduces the feed cost.
- Low cost farm-made feed can be prepared on farm site easily to feed

the fish.

- At the end of the demonstration programme one workshop was organized in which fish farmers from different places participated and got motivated to take up such culture practice.
- The trainees of RKMSSSM developed skill with self confidence to adopt aquaculture practice as one of the avenues to upgrade their livelihood status and scope for self-reliance as well.

Recommendation for further dissemination

- Locally available feed ingredients can be used for preparation of farm-made feed instead of costly feed ingredients. Other low cost oilcakes as mentioned above can be used in recommended ratio.
- Self help groups or individual farmer can take up the farm made feed preparation activity as part of income generation programme.

SUMMARY

An 8 months feed demonstration programme was conducted in ponds

of Ramakrishna Mission Belur Math, West Bengal, India. The demonstration programme was conducted to give on hand training to 30 trainees of 20 districts of West Bengal associated with Samaj Sevak Sikshan Mandir (SSSM) on farm made feed. Two ponds were selected of size 0.1 ha at Shilpamandira (Feed 1) and another of 0.08 ha at Samaj Sevak Sikshan Mandir (SSSM) (Feed 2) where catla and rohu were stocked @ 4,500/ha. The polyunsaturated fatty acid (PUFA) content of fish in final harvest ranged from 21.38 to 22.88 (%). The feed demonstration result indicated that estimated net production (t/ha/8 months) was 4.9 and 6.8, respectively, with til oilcake (Feed 1) and mustard oilcake (Feed 2) incorporated feeds, respectively. At the end of the demonstration programme the trainees developed self confidence and skill for taking up aquaculture as their future livelihood.

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Soy-based fortified food bars for undernourished children

A protein rich formulation of composite cereal bar was developed based on soya and cereals like wheat, rice, sesame and mungbean. The developed soya composite cereal bar contains cocoa powder, coconut milk, skimmed milk powder, butter and sugar having protein and fat contents are 18–19% and 24–25%, respectively. Compressed protein bar with acceptable sensory quality, peroxide value, FFA content and microbial stability, has a shelf-life of 3 months, when packed in polypropylene and 4–5 months in metallized packing stored at ambient temperature as well as 37°C.



Protein rich soy based fortified compressed food bars for undernourished children

