

Imparting skill on formulated fish feed preparation to women's self-help groups in villages – an experience

Subrato Ghosh

122/1V, Monohar Pukur Road, P.O. Kalighat, Kolkata – 700026, West Bengal, India. Email: subratoffa@gmail.com

Farm-made pelleted fish feed

Fish feed is a major input in inland pond-based fish farming in India and accounts for around 55-60% of the total cost of production. Good quality feed ensures proper body growth of farmed fishes and helps to achieve the expected production level at the end of the culture period. In composite fish culture, major and minor carp fingerlings are fed twice daily during grow out continuously for 6-10 months till the fishes attain adult/marketable size. Livelihood-oriented small-scale aquaculture is practiced by progressive fish farmers with limited resources in remote villages in different districts of West Bengal and neighbouring eastern Indian states. For such farmers, it is desirable that supplementary pelleted feed is prepared for cultivable carps using locally available, affordable ingredients and made available to them. Such feed should have 25-32% protein content and be effective and affordable enough for fish farmers to purchase regularly while improving their profit margin.

Such pelleted feed, nowadays termed 'farm-made floating feed', is superior to hand-formed dough balls as fishes consume the former quickly, it is easy to apply, reduces wastage, and is nutritionally balanced with fat, carbohydrate, protein, minerals and binder components. It will meet the nutritional requirements of major and minor carps from fingerling stage up to adult. This feed may be prepared by individual fish farmers in their own farms, by members of farmer collectives who have formed registered fish production groups at Gram Panchayat level and by members of progressive women-led self-help groups (SHGs) in villages, not far from fish farms.

Women's involvement in fish feed preparation

Production and sale of farm-made feed for carps and ornamental fishes to local farmers in the same Gram Panchayat or block, or a neighbouring block in the same district is an important women-friendly vocation, with good prospects and is suitable for them, contributing to empowerment of rural women. It can be adopted and implemented by them if they are trained properly; it is less capital- and labour-intensive; and as they gain expertise, they can begin in a medium scale commercially. Their participation in this income-generating activity can improve economy of rural families. Rural homemakers as entrepreneurs, literate and semi-literate, can adopt indigenous fish feed preparation professionally as a serious cottage industry through SHGs and can improve their earnings.

As discussed, farm-made floating pelleted fish feed preparation can become a profitable and sustainable income-generating entrepreneurial activity for women SHGs in rural



Above: Participants in a training programme at Kailashpur PACS. Below: Preparing fish feed.



Sample ingredients (in duplicate) for preparation of fish feed.

areas. Using such feed can help small-scale marginal fish farmers to improve fish production at minimum cost. The Directorate of Cooperation, Government of West Bengal (WB) aims at empowering underprivileged women in economically challenged sections of rural WB by imparting training in fish feed preparation, amongst other measures. Recently, the author demonstrated and disseminated knowledge on pelleted feed preparation for major and minor carps and aquarium fishes with care to 110 rural women SHG members in four programmes funded by the Directorate in South 24 Parganas District, WB.

Primary Agriculture Cooperative Credit Societies and women SHGs

In the West Bengal State Government, the Directorate of Cooperation is headed by Registrar of Co-operative Societies. Each of the 22 Range Offices of this directorate covers a district, headed by one Assistant Registrar of Cooperative Societies or Deputy Registrar of Cooperative Societies (DRCS). Primary Agriculture Cooperative Credit Societies (PACS) at block level are one type of cooperative societies, essentially short-term credit cooperatives, registered at office of ARCS/DRCS at district headquarters. PACSs enrol women SHGs as their members, the latter becoming eligible for credit-linkage through PACSs which organise and nurture them. This is called 'Samabaay Krishi Unnayan Samity' in Bengali, formed with a cluster of villages in each block, by farmers and artisans and coordinated from district level.

At state level, the Directorate of Cooperation focuses on organisation of women SHGs aiming to empower women and ensure employment for youth. Upgrading skills through training for SHGs (for achieving self-reliance on a sustained basis) is a scheme implemented by the directorate, which also provides financial support; funds are sanctioned in every district in every financial year. With improvement of their vocational skill, women can undertake income-generating activities. SHGs are formed under the aegis of PACSs; training is imparted in cloth stitching, preparation of value-added food products, flower-based products, tailoring, embroidery, handicraft making, poultry farming, and women-friendly homestead fish culture.

Venues of training and demonstration

In financial year 2020-2021, two kinds of training programmes (four in all) in the fishery sector were organised by office of DRCS, South 24 Parganas District headquarters: 1) Preparation of formulated fish feed for major and minor carps, and 2) Breeding and propagation of aquarium fishes and their feed preparation. Venues of the two programmes of first kind were: Raimonikhaki PACS, i.e., Raimonikhaki Samabaay Krishi Unnayan Samity (SKUS) Limited, Village Raimonikhaki, P.O. Bakultala, GP Dighirpar-Bakultala, Block Mathurapur-II, Dist. South 24 Parganas (organised during January 2-3, 2021) and Kailashpur SKUS Limited, Village and P.O. Kailashpur, GP Roydighi, Block Mathurapur-II, South 24 Parganas (organised during December 26-27, 2020). Venues of two programmes of second kind were: Uttar Krishnapur SKUS Limited, Village and P.O. Uttar Krishnapur, GP Amratala, Block Mograhat-II,



Trainees and PACS officials at Raimonikhaki PACS.



Two groups of trainees at Raimonikhaki PACS preparing fish feed.



Trainees at Uttar Krishnapur PACS preparing fish feed.

South 24 Parganas (organised during February 20-22, 2021) and Uttar Durgapur SKUS Limited, Village Uttar Durgapur, P.O. Jumai Naskarhat, GP Rabindra, Block Kakdwip, South 24 Parganas (organised during February 27 - March 1, 2021).

Each of two programmes of the first kind was of two-days and each of two programmes of the second kind was of three-days duration. The author was the resource person and demonstrator in all four trainings. Afore-mentioned four PACSs started their journey from the late eighties, and, like other PACS in West Bengal, have credit linkage with provision of training facilities for members of enrolled women SHGs which the PACSs have organised.

Participants as first-time learners

These extension and skill-development oriented programmes (awareness creation about farm-made pelleted feed) were first of its kind organised by office of DRCS, South 24 Parganas in Mathurapur-II, Mograhat-II and Kakdwip blocks. In each of the first two programmes on 'Preparation of formulated fish feed for major and minor carps', participants included 25 local women representing six SHGs and in each of last two programmes on 'Breeding and propagation of aquarium fishes and their feed preparation', participants included 30 women representing ten SHGs. All the SHGs were 8-24 months old. Organising such programmes was indeed a noteworthy approach before International Women's Day 2021, which will contribute to rural society.

Feed preparation for carps

In four hands-on training programmes, after detailed discussion on the importance, principles and practices of fish feed preparation and background knowledge in audio-visual lecture sessions, the author demonstrated the technique of pelleted feed preparation to trainees. In each of two programmes organised at Raimonikhaki PACS and Kailashpur PACS, trainees were introduced to the ingredients for feed preparation for carps in grow-out ponds from fingerling stage (25-40 g at stocking).

In each of two trainings, 25 trainees were divided into four groups. Each group followed two standard feed formulations separately, 400 g in quantity (sample) for each. The first one comprised musur dal chunnie (MDC; lentil pulses byproduct) 40 g, maize dust 40 g, rice bran 80 g, powdered mustard oil cake (MOC) 180 g, soyabean dust 40 g, powdered vitamin-mineral tablet 4 g, ghee residue 8 g, groundnut oil 8 ml, and a very little linseed sludge. Feed ingredients were weighed using an electronic weighing balance brought from a local grocery shop. In the second training, wheat flour 40 g used instead of MDC, which wasn't available.

The second formulation comprised rice bran 160 g, powdered MOC 100 g, powdered fish meal 60 g, maize dust 40 g, wheat flour 35 g, vitamin and mineral mixture 1 g, and soyabean oil 4 ml. In both cases, lukewarm water added @ 60-100 ml / 200 g to dry mixed feed. Trainees were informed about specific ingredients as sources of protein, fat, carbohydrate; sample feed had crude protein content of 25% and fat 2-4% content. The author guided trainees in all groups to do activities in succession, viz., segregation and labelling of already-procured raw materials/ingredients, grinding (pulverising) in a kitchen mixer-grinder, weighing accurate amounts and dry mixing in proper proportion, dough preparation, pelleting in hand pelletisers using a 3.0 mm die, drying of feed pellets at room temperature in plastic trays, and breaking pellets into



Sample feed prepared by trainees at Uttar Krishnapur PACS.



Sample feed ingredients weighed by trainees at Uttar Durgapur PACS.



Author in lecture session on backyard fish farming and feed preparation.

small particles by hand. Pelletisers were provided to each group of trainees in practical sessions; they were introduced to the die, pellet cutter and mode of operation.

Trainees were informed about local prices of good quality feed ingredients; the usefulness of 10-minutes of mild steaming of feed dough balls in pressure cookers; vitamin-mineral to be added after bringing it to room temperature. The

addition of a little powdered menthi, i.e., fenugreek, neem (*Azadirachta indica*) leaves, turmeric and garlic improves the quality of prepared feed; addition of sugarcane molasses @ 2-3% in feed improves digestibility; storing ingredients in dry locations; keeping plant-based ingredients in hot water before use to remove anti-nutritional factors; storing prepared feed for a maximum of 75 days; feed bagging as 2-10 kg packs with date of manufacture (DOM); use of sodium benzoate in bags as preservative.

Feed can be sold by SHGs to grow-out carp farmers @ INR 28-34/kg. Officials of each of four PACSs arranged the programmes nicely and provided all necessary assistance. They informed that large-scale grinder machine costs INR 16,000-22,000/-, atta chakki machine may be used and portable hand pelletiser (noodle maker or meat mincer) machine costs INR 2,200-6,000/-, made of steel/aluminium alloy, with a feed production rate 2-4 kg/hour (dry weight) and of diameter 1.5, 2.0, 3.0, 4.0 mm. Electricity and motor-operated pelletiser produces feed @ 40-50 kg/hour.

Feed preparation for aquarium fishes

Breeding and propagation of freshwater aquarium fishes in cement cisterns and hapa cloth enclosures in backyard ponds has brought increasing employment opportunities for rural women SHGs in West Bengal through small- to medium-scale farming units. In 29 blocks of South 24 Parangas, among many others, there exist 167 women SHGs involved exclusively in this vocation and mostly they use costly imported aquarium fish feed. This scenario encourages other women SHGs to prepare and supply feed for the fishes. In each of last two hands-on training courses organised at Uttar Krishnapur PACS and Uttar Durgapur PACS, trainees were introduced to the ingredients required for feed preparation for cultivable aquarium fishes.

In each of the trainings, 30 trainees were divided into five groups. Each group followed one formulation developed by ICAR-CIFE Kolkata Centre, 200 g in quantity (sample) for each. It comprised powdered fish meal 30 g, soyabean meal 44 g, powdered ground nut oil cake 50 g, rice bran 32 g, wheat flour 24 g, starch powder 6 g, sunflower oil 4 ml, vitamin-mineral mix 2 g. Dried and pulverised petals of either China rose or marigold of quantity 8 g was necessary as fish body colour enhancer, but wasn't available locally. Steps for feed preparation and other particulars in these two trainings were followed as per that in other trainings on carp feed preparation, but the die in hand pelletiser used by trainees had 0.8-1.0 mm diameter. In technical and practical sessions, trainees in 'Breeding and propagation of aquarium fishes and their feed preparation' were informed about egg laying and live-bearing ornamental fish species, techniques for producing young ones, rearing, total income and expenditure involved, feed and water quality management, precautions, medicines, glass aquarium tanks and equipment, live feeds, aerators, immersion heaters, zooplankton nets, polythene packets for selling fishes and other aspects.



Home-made formulated fish feed dry mix.



Meat mincer for fish feed preparation.



Motor-operated grinder and fish feed production unit.



Portable hand pelletiser for pelleted feed preparation.

End note

Interested members of selected SHGs, belonging to small holder farm families, were called to participate in the four needs-based training programmes. It enriched participating women (110 representing 32 SHGs in all), provided self-confidence and skill. They were encouraged to begin on a small- to medium-scale, to ensure regular supply of quality fish feed adequately at affordable price to local carp farmers and aquarium fish growers, to be used within 2-3 months from date of manufacture. Farmers in turn will realise better profits, can procure it at the farm gate and will certainly reduce their production cost. Farm-made pelleted fish feed should be made available to fish farmers in every corner of West Bengal. Women SHGs can also manage mini fish feed mill (capacity 200 kg/hour at 80% efficiency, 8 hours/day), if installed. Photocopies of detailed required printed information material in Bengali on the two subjects of training were provided to head of each of the participating 32 SHGs. Hand pelletisers were handed over to them permanently by PACS officials for use in days to come, to give these trained SHG members a real idea on how to market and sell the prepared feed and get a good return.

The author participated in a two-day training on 'Fish nutrition and feeding management in aquaculture' two years ago (February 2-3, 2019) at the University of North Bengal. As feedback, we learnt that most SHGs had started putting the knowledge gained into practice at home sites after discussing among themselves and hopefully will continue on with it. PowerPoint presentations of the author with attractive self-taken photos and lucid text matter left a good impression in them. Trainees followed COVID-19 protocols, used masks, sanitiser, and maintained distancing. More extension-oriented technology transfer programmes on preparation of balanced farm-made pelleted fish feed will be organised in days to come with funding support from the Directorate of Cooperation, Directorate of Fisheries and Project Director, District Rural Development Cell under the West Bengal Government in different districts involving more SHGs, and a standard package of practice as appropriate rural technology may be provided to them.