TERMS OF REFERENCE FOR THE R&D PROJECT

Food and Agriculture Department

Fish, fisheries and Aquaculture Sectional Committee, FAD 12

1 Title of the Project

Study of Fish Feed for ornamental fisheries, for determining its Quality and Safety Parameters.

2 Background

The global ornamental fish market potential is valued at USD 6 billion approximately and India has considerable potential in production and trade of ornamental fish due to the rich biodiversity of species hailing from diverse aquatic ecosystems, a favourable climate and the availability of a huge pool of low cost labour. Feed has a prominent role to play in ornamental fish business as the fish require balanced nutrition constituted by vitamins, micro nutrients, and other dietary components for good health, fast growth and for developing attractive colours. The industry is also a big user of waste and by-products of meat and slaughter house industry, which in turn promotes sustainable value chain by utilizing waste/by-product of one industry and thereby reducing the emission of GHG gasses and turning the resources used in production of meat into more valuable output.

A number of aqua cultured fish feed standards have been developed by the Fish, fisheries and Aquaculture Sectional Committee, FAD 12 of BIS (may be downloaded from BIS website www.bis.gov.in) and a need was felt to initiate work for ornamental fish feed as no regulation or standard is published in this field till now.

There is a huge market for feed for ornamental fisheries and the majority of the feeds are being imported currently. The ornamental fish feed products available in the market are highly variable in safety and quality parameters. There is a lack of data on types or varieties of fish feeds for ornamental fisheries available and their nutritional content, composition and quality with respect to the wide range of product price being charged. In this backdrop, this project is envisaged to study the different type of fish feeds for ornamental fisheries available and determine their safety and quality in terms of nutrient composition, functional compounds and their benefits for fish.

3 Objective

To collect technical data and scientific evidence with respect to fish feed market for ornamental fisheries, types/varieties, quality and safety parameters, raw material quality, good packaging and storage practices.

4 Scope

4.1 Thorough review of the available literature on fish feed for ornamental fisheries, including but not restricted to the following and provide comparative analysis:

a) International and National guidelines;
b) Regulatory stipulations;
c) Research publications;
d) National import export data;
e) National infrastructure; and
f) Any other sources.

4.2 Identification of manufacturing base of fish feed for ornamental fisheries in India along with categorization of large, medium, small and micro units. Collection of information on physico-chemical properties of fish feed for ornamental fisheries, its test methods and packaging. The study shall focus on different geographical regions of the country and feeds types or varieties available in market with respect to the size of fish (small or big or large fish), feeding behaviours of fish (herbivorous, carnivorous or omnivorous fish), feeding patterns like bottom feeder or surface feeder, special functional compounds and their associated claims by manufacturers.

4.3 Determination of testing infrastructure available in India for fish feed for ornamental fisheries, characteristics being tested and test methods being followed.

4.4 Undertake industry visits covering both small scale and large scale units (2 units in each) to collect information on manufacturing processes, critical control points, raw material checks and parameters, GHP/GMP, in process controls, end product specifications, packaging and storage requirements, waste disposable and biohazard treatment protocols and major types of feed in demand. Further, study the sustainability aspects of the processes followed by industry such as energy conservation, waste management, 4Rs (Reduce, Reuse, Recycle, Recover), carbon footprint etc. Prepare a questionnaire for this purpose.

4.5 Identification of user base of fish feed for ornamental fisheries and collection of feedback on intended applications, product quality, and performance satisfaction.

4.6 On the basis of literature review and industry visits establish the sampling plan covering a minimum of 50 samples from different manufacturers.

4.7 Testing of collected samples from NABL accredited labs/ labs of ICAR or CSIR Institutes, Labs of MoU partner Institutes, on parameters including but not restricted to physico-chemical characteristics, aflatoxins, additives, physiologically active substances etc.

4.8 Recommend suitable and sustainable packaging materials and storage conditions for fish feed for ornamental fisheries for reduction/control of aflatoxins.

5. Research Methodology

5.1 Undertake thorough literature review as per **4.1** and prepare summary report including comparative analysis.

5.2 Identify manufacturing base categorized into large, medium, small, and micro. Contact the manufacturers and collect information using a structured questionnaire. Inform them about requirement of industry visit and collection of samples of fish feed for ornamental fisheries.

5.3 Identify exporters and importers of fish feed for ornamental fisheries. Contact them and collect information using a structured questionnaire as per **4.2, 4.3** and **4.4**. Inform them about requirement of collection of samples.

5.4 Undertake visit to identified manufacturing units (preferably 2 large and 2 small scale), considering criteria set in 4.4 and the following activities shall be carried out and report prepared:

i) Observation on:
   a) Raw material being used and its properties;
   b) Manufacturing process being utilized;
   c) Physiologically active substances or additives used, if any
   d) Types or varieties of the product being manufactured;
   e) In-process quality control;
   f) Characteristics being tested for the final product and test methods being used;
   g) Marking and labelling; and
   h) Packaging practices.

ii) Discussion with relevant persons of industry regarding:
   a) Quality and safety specifications of raw material and finished product along with the process control parameters;
   b) Sustainability practices being implemented;
   c) Buyers/users of the fish feed for ornamental fisheries manufactured at their unit; and
   d) Collection of samples for all types/varieties of fish feed for ornamental fisheries manufactured in the unit.

5.5 Identify users of fish feed for ornamental fisheries. Contact the users and collect information using a structured questionnaire.

5.6 Identify laboratories for testing of fish feed for ornamental fisheries. Conduct visits to the laboratories, observe characteristics being tested and test methods being followed. Preferably one government laboratory and one NABL accredited private laboratory/ labs of ICAR or CSIR Institutes, Labs of MoU partner Institutes should be covered in the visits.

5.7 Undertake testing of the collected samples for the characteristics identified using recommended test methods. If the manufacturer has claimed any additional properties, the same should also be tested as per the test method declared by the manufacturer. Test report for each sample shall have complete information on source of the sample (manufacturer/importer), physicochemical parameters, manufacturing process, reported values, and test method used.

5.8 Based on the test reports and information collected through questionnaires, visits and discussion, analyze and establish correlation amongst safety and quality parameters, manufacturing process, and major types of fish feed for ornamental fish used and submit project report.

6 Expected Deliverables

6.1 Project report, in hard copy and digital formats, covering all aspects mentioned in scope.

6.2 Questionnaires, discussion and visit reports, test reports, to be appended with the project report

7 Timeline and Method of Progress Review

7.1 Timeline for the project is 6 months from the date of award of the project.

7.2 Stages for Review:

7.2.1 Stage I: At the end of 1st month, project allottee shall prepare a comprehensive plan identifying the following:

a) Details of literature review carried out and summarized report;
b) Identified manufacturers, exporters, importers, laboratories, and users;
c) Information obtained through questionnaires from the above-mentioned stakeholders and visits to be carried out;
d) Laboratory where testing is to be carried out; and
e) Proposed characteristics and relevant test methods to be used as per clause 4 and associated sample volume and sampling plan.

7.2.2 Stage II – At the end of 5th month, project allottee to submit draft report covering all aspects mentioned in scope including the following information:

a) Details of visits carried out to manufacturing units and laboratories;
b) Details of physico-chemical characteristics of fish feed for ornamental fisheries and manufacturing processes being used;
c) Number of samples collected with information related to source of the sample (manufacturer/importer);
d) Test reports and analysis of data collected/generated;

Sectional Committee will evaluate the draft report and provide feedback/recommend changes, if required. At the end of 6th month, project allottee to submit final project report incorporating recommendations/feedback of Committee.

Note: The timelines given above are indicative and calculation of time will start from the date of award of sanction letter for the project to the Project leader.

8 Support from BIS

8.1 Access to Indian and International Standards

8.2 Letters from BIS to concerned stakeholders, wherever required for support in research project.

9 Nodal Officer

Ms. Navita Yadav, Sc. D, FAD, BIS, may be contacted at fad12@bis.gov.in for any queries on the research project.