

MFFASA / DST Sector Innovation Fund
CALL FOR RESEARCH AND DEVELOPMENT FUNDING PROPOSAL

BACKGROUND

The Marine Finfish Farmers Association of South Africa (MFFASA) is a registered non-profit organization that was established to represent its members in the promotion and development of marine finfish farming as an economically sound and environmentally sustainable industry in South Africa. The marine finfish industry in South Africa has developed over the past 10 years to supply fresh sustainably farmed marine finfish, such as kabeljou, to many major retailers and food service industry clients in South Africa.

The industry now needs to improve its production systems and expand its client base outside of South Africa and export in order to expand production capacity and fulfil its potential as a contributor to GDP and Job Creation.

OBJECTIVES OF THE MASSIF PROGRAMME

The MFFASA – Department of Science and Technology Sector Innovation Fund (MASSIF) Programme is an initiative to support research and technology development in marine finfish farming industry, including to:

1. fund research, development and innovative (R&DI) projects and post-graduate bursaries aligned with the marine finfish aquaculture industry's needs;
2. fund R&DI projects and post-graduate bursaries aligned with the Department of Science and Technology criteria ;
3. enhance R&D capacity and science, engineering and technology excellence;
4. increase the human capacity development in science, engineering and technology with aquaculture competence ;
5. develop the relevant and applicable production technology required to establish a technologically advanced aquaculture industry in South Africa;
6. promote the development of a network of collaborators both locally and internationally;
7. generate commercialisable Intellectual Property that supports innovative products, systems and/procedures;
8. increase the overall competitiveness of the aquaculture industry internationally which will lead the creation of more jobs.

RESEARCH THRUSTS

The marine fish farming industry in South Africa at this time is pioneering in terms of species, the technology applied and the environment it is applied in. There are three types of fish production systems (sea-based cage farming systems, land based Recirculating Aquaculture Systems (RAS) farming systems and land-based pond farming systems) presently employed in South Africa. In order for the Industry to grow it has become essential to increase understanding of constraints and

challenges of all three types of fish production systems. Therefore it is acknowledged that scientific research is crucial in playing a part in unlocking its potential.

Research and development needs have been broken down into 'Thrusts' - which are applicable to all industry role players at this time. These Thrusts are ranked in order of significance where the need for the first thrust is the highest and the last thrust the lowest and proposals in respect of these thrusts are particularly encouraged.

1. Aquaculture Systems Management Thrust

In order for an aquaculture business to be successful the system that is utilised to produce the cultured animals needs to be efficiently managed. By correctly employing the appropriate technologies greater efficiencies can be realised. By investigating various technologies and management protocols the systems and the management thereof can be improved resulting in greater economic viability. Present areas of interest include:

- Oxygen application technology in RAS, pond and cage systems.
- The benefits of polyculture with Dusky Kob and Spotted Grunter in open earth ponds.
- Control of algal blooms in ponds to reduce the impact of oxygen depletion at night and so improve the pond environment for the cultured animals in order to enhance growth.
- Determining the effect of gas supersaturation in RAS systems, with the emphasis being on Carbon Dioxide, Nitrogen and Oxygen on the growth of Dusky Kob.
- A comparison between oxygen monitoring technologies (traditional membrane based vs new LED based systems).
- An investigation into techniques available for the controlled harvest and humane slaughter of fish while ensuring a high quality product.
- Automated vs hand feeding strategies in culture systems.
- An investigation of anti-fouling agents in cage-based systems.
- The integration of farm management software to optimize production performance.

2. Feed development Thrust

The South African marine finfish industry is currently reliant on importing feed from Europe, which is becoming prohibitively expensive due to the current exchange rate. Irrespective of the culture system being utilised, a significant production cost is feed. Great local advances have been made in this area in the development of a local diet for reticulating aquaculture systems (RAS) and while much of this knowledge can be transferred, little has been done on diet development for cage and pond farming. The utilisation of cheaper ingredients as well as ingredients that are more sustainable have resulted in expansions in the culture of farmed animals that would not have occurred had these advances not been made and this is viewed as an opportunity for local diet development. In order to formulate the most cost effective and sustainable diet for the industry a collaborative research philosophy needs to be instilled to ensure rapid success invested in this area. In addition, the development of a local feed will increase capacity of existing feed manufacturing plants and create job opportunities.

3. Biosecurity and Disease Management Thrust

In the last two decades the aquaculture industry has experienced tremendous losses due to disease outbreaks on a global scale. In order to prevent catastrophic epidemics, a holistic approach to biosecurity and disease management needs to be followed. In intensive animal aquaculture, diseases that were not known for causing mass mortalities in wild populations can cause substantial losses. Research is essential to understand and manage these diseases to prevent animal stock and financial losses to the industry. By implementing the correct and

effective biosecurity protocols a number of diseases can be prevented from entering aquaculture systems.

4. Health Management Thrust

Healthy stock is crucial to a successful aquaculture operation; factors that determine this are largely the quality of feed and the culture environment. The culture environment consists of the chemical (inorganic and organic molecules), biological (bacterial and viral loads) and the physical environment (temperature, pH, alkalinity etc.). Research is required to better understand how fish interact with their environment and what their tolerance is of these variables. Understanding the effect of the culture environment on the cultured species not only has an impact on the health and wellbeing of the fish but has a fundamental impact on the system design and operation. In particular, there is a need to better understand the tolerance of dusky kob to inorganic nitrogen as well as heterotrophic bacterial loads in the culture water.

5. Genetics Thrust

The field of genetic research has grown dramatically in the last decade. As the technologies that enable gene sequencing have become cheaper and more available, the application of research being conducted in this field has had spectacular results in the more established poultry and pig farming sectors. In the salmon industry this technology is being used to selectively breed salmon that are resistant to specific problematic diseases. As the aquaculture sector matures genetic technologies will be increasingly useful. Dusky kob (*Argyrosomus japonicus*) is a high value finfish species that has been characterised as an emergent aquaculture species in South Africa. With this species it has been established that there is a need for selective breeding.

6. New Aquaculture Species Thrust

The South African region has a great biodiversity with many species of fish that occur along the coastline. Very few of these fish species have had research effort devoted to them as potential species to be utilised in aquaculture. There is a need for a set of criteria to be developed that can be utilised for identifying potential species that could justify funds and effort for investigating their culture. Key features that need to be considered are access to potential brood stock, growth rates, food conversion ratios, ease of mass fry production, adaptability to captive conditions and hardiness. Fish Species of particular interest are the Seventy Four (*Polysteganus undulosus*), River Snapper (*Lutjanus argentimaculatus*), Spotted Grunter (*Pomadasys commersonii*), White Margined Sole (*Dagetichthys marginata*) Geelbek (*Atractoscion aequidens*) and Yellowtail (*Seriola lalandi*).

REPORTING

- Six monthly progress reports are to be submitted to the MASSIF Program Coordinator indicating progress against agreed milestones and Key Performance Indicators.
- The MASSIF Program Oversight Committee will meet six-monthly to review progress.
- An Annual MASSIF Programme Research Meeting will be held (to coincide with the Oversight Committee meeting) at which all Project Leaders and students are expected to present their work. The majority of the costs to attend these meetings will be covered by MFFASA and therefore need not form part of the project budgets.
- In addition, writing of technical reports, publication of results in relevant journals and presentation of research works at relevant congresses will form part of the Programme's key performance indicators.

SUBMISSIONS OF PROPOSALS

MFFASA hereby invites interested parties to submit *Expressions of Interest* to the MASSIF Programme funding. Submissions will be evaluated by the MASSIF Oversight Committee where after successful submissions will be requested to submit a comprehensive *Application for Project Funding* for final consideration.

Please note:

- Proposals must clearly indicate how the proposed project(s) will address and deliver upon the specific MASSIF Programme Thrust objectives listed above.
- Additional supporting documentation may be attached.
- Clear linkages between the R&D projects proposed and the retention/creation of jobs must be highlighted.
- Proposals must show clear evidence of development of human capacity in science, engineering and technology to supply enhanced science, engineering and technology capacity to design, build and operate Finfish culture of the future.
- Proposed projects must not duplicate work carried out elsewhere (applicants should have a good knowledge of such relevant work) but should seek to make use of complementary skills and knowledge available through appropriate collaborations.
- Intellectual Property rights are to be reserved for unrestricted, royalty-free use by the Marine Finfish Farmers Association for South Africa.
- Applicants may be required to supply additional supporting information and or to modify their proposals.
- The approval and continuation of support of projects shall be at the discretion of the MASSIF Programme Oversight Committee, and the Oversight Committee shall not be obliged to divulge or justify reasons for any decisions made in respect of project approval or support.
- Only successful applicants will be responded to.

TIMELINES

Announcement of call	12 January 2015
Deadline for Proposal submission	23 January 2015
Review process	24 January - 16 February 2015
Award notification	23 February 2015
Completion of contracts and transfer of funds	No later than 31 March 2015 ^(Note 1 below)

¹ Subject to MFFASA being in receipt of funds from DST

Expressions of Interest for project funding as well as *Applications for Project Funding* forms are available; please contact Karin Fivaz at research@mffasa.org. For more information please visit the MFFASA website www.mffasa.org. Take note that Expression of Interest for project funding should be submitted no later than **12:00 23 January 2015**.