



Terms of Reference (TOR)

Demonstration project on the application of biological control agents (BCA) as a countermeasure against antimicrobial resistance (AMR) in aquaculture and livestock in ASEAN

The ASEAN Secretariat and the Japanese Government, through the Japan-ASEAN Integration Fund (JAIF), invite applications from consultants to implement the above-referenced project.

I. Background of the Project

The aquaculture and livestock sectors are important sources of animal protein nutrition and livelihood among the people in Southeast Asia. The rising demand for animal source nutrition is being met with a transition to intensive animal production systems characterised by high production volume, intensive land use, and intensive use of chemical inputs or feeds and water resources.

The recent intensification of animal production systems to boost food production has resulted in increased usage of antibiotics, which are often used for disease prevention, treatment and growth promotion. However, the misuse and overuse of antimicrobial agents contribute to the development and spread of antimicrobial-resistant bacteria among animals, the environment, and potentially to humans. Antimicrobial resistance (AMR) is a global health concern as it can lead to treatment failures and the spread of difficult-to-treat infections in animals. AMR also undermines food safety and sustainable food animal production and welfare as resistant bacteria can spread from animals to humans by direct contact, and consumption of contaminated food products increasing the risk of antimicrobial-resistant infections in humans. It can lead to the release of antimicrobial residues and resistant bacteria into the environment through manure runoff, soil contamination, and water pollution contributing to the spread of AMR beyond farm boundaries and into the broader ecosystem.

In response to this growing concern, there is a need to explore alternative solutions to combat AMR in the ASEAN region. The use of biological control agents (BCAs) has gained considerable attention as a potential solution, and there is increasing evidence to support their efficacy in controlling various diseases in aquaculture and animal husbandry. BCAs include classes of effective phytobiologicals as well as effective microbes (beneficial microbes); naturally occurring microorganisms, such as bacteria, viruses, and fungi, that are used to control pathogens and promote the health and productivity of animals and plants. The mechanism of the action of BCAs whether phytobiological or effective microbes either involve bio-control using the interactions of micro-organisms to repress the growth of deleterious bacteria and viruses. Phytobiologicals derived from various plant sources have gained importance as additives in fish feed and are seen as a promising alternative to antibiotics due to the presences of various bio-active compounds. BCAs are generally considered

environmentally friendly alternatives to chemical pesticides and antibiotics. They can help reduce the reliance on synthetic chemicals in agriculture, minimize the negative impacts on beneficial organisms, and promote sustainable agricultural practices.

This project aims to study the application of biological control agent (BCA)-based strategies in aquaculture and animal husbandry as an alternative to antimicrobials. It will involve a combination of in vitro and in vivo studies, as well as field trials, to assess the efficacy of BCA-based strategies in controlling various diseases in aquaculture and animal husbandry. It will also conduct a comprehensive review of existing literature to gather information on the use of BCAs in the ASEAN region and other parts of the world.

This project supports the implementation of the ASEAN Strategic Framework to Combat Antimicrobial Resistance through One Health Approach (2019-2023) and Plan of Action for the ASEAN Cooperation in Combating AMR in the Aquaculture Sector (2021-2025) by strengthening regional capacity on the use of alternative approaches to antibiotics and promoting knowledge of veterinary products and AMR.

This project also supports the Revised Implementation Plan of the Vision Statement of ASEAN-Japan, Friendship and Cooperation: Shared Vision, Shared Identity, Shared Future, through capacity building and sharing of the best experiences and practices to address AMR in the livestock and aquaculture sectors using alternatives to antibiotics and ensure that risk associated with AMR use are minimized or eliminated across the food supply chains and food systems.

This project is in line with the ASEAN Outlook on the Indo-Pacific (AOIP) by supporting the implementation of existing ASEAN priority areas of cooperation in food, agriculture and forestry and thematic areas of the Sustainable Development Goals, particularly Goal 1: Ensuring sustainable food production systems and Goal 3: Promoting good health and well-being. This project promotes AOIP's principles of mutual benefits and good governance by engaging all AMS to participate in capacity-building activities to mitigate, prevent, and control AMR.

II. Objectives

The overarching goal is to help mitigate the negative impact of AMR on animal and public health by examining the potential application of biological control agent (BCA)-based strategies in aquaculture and animal husbandry as alternatives to antimicrobials. The more specific objectives of the project are as follows:

- i. To establish the efficacy of BCA-based strategies for controlling diseases in aquaculture and animal husbandry sectors; and
- ii. To develop knowledge products, including technical reports and policy briefs outlining key findings and recommendations as reference for relevant policy development.

III. Outputs

The project is expected to produce:

1. Output 1: Inception Report

The consultant will prepare an inception report that will outline the project approach and design, methods and data collection, preliminary findings (literature review) and work plan.

- This would involve conducting a thorough review of existing literature and research on AMR, the prudent use of antimicrobials, and BCA-based strategies for controlling various diseases in aquaculture and animal husbandry.

2. Output 2: Research on the efficacy of BCA for disease control in aquaculture and animal husbandry.

The consultant will research the efficacy and challenge testing on a variety of effective microbes as well as the use of phytobiological BCA in controlling various diseases in aquaculture and animal husbandry. The key activities will include:

- i. Design of experiments: This would entail consultation with experts in the field of aquaculture, animal husbandry, and AMR to gather their insights and expertise on the topic. Collaboration with research institutions with the requisite instruments and experience to design experiments to assess the efficacy of BCA-based strategies in controlling various diseases in aquaculture and animal husbandry, including the selection of appropriate experimental groups, sampling protocols, and data collection methods.
- ii. Implementation of experiments: This would involve carrying out the experiments as per the design, including the application of BCA-based strategies and monitoring the health of the aquaculture and animal husbandry
- iii. Data collection and analysis: This would involve collecting and analysing data on the efficacy of BCA-based strategies in controlling various diseases in aquaculture and animal husbandry, including measures of disease incidence and severity, as well as any other relevant parameters
 - Laboratory and field tests are expected to be carried out on both a common commercial fish species in ASEAN as well as a common commercial broiler species. Efficacy tests would be carried out and challenged against common infection and pathogenic species in the region.
- iv. Evaluation of the cost-effectiveness of BCA-based strategies in controlling various diseases in aquaculture and animal husbandry, including the costs of applying the BCAs, the costs of treating diseases with antimicrobials, and the costs of any other relevant parameters.
- v. Development of a technical report that will synthesise the information gathered from the review of literature, consultations with experts, in vitro and in vivo studies, including field trials on the efficacy of BCA in controlling various diseases in aquaculture and animal husbandry.

3. Output 3: Model/Demonstration farms for showcasing the effectiveness of BCA use in aquaculture and livestock are established

Model farms will be used for the demonstration of study results for on-site workshops/training on the application of BCA-based strategies. The key activities will include:

- i. Selection of the location for the demonstration farm: It is important to choose a suitable location that will provide the right environment for the growth and development of the fish and chickens being raised in the aquaculture and animal husbandry industries.
- ii. Establishment and operation of demonstration farm: This would involve the establishment and operation of the necessary infrastructure for the model farm, including water and feed systems, animal housing, and grow-out tanks for aquaculture.
- iii. Stock selection and management: This would involve selecting the appropriate species of fish and chickens to be raised in the model farm, as well as developing a management plan for feeding, health monitoring, and disease control.
- iv. Implementation of BCA-based strategies: This would involve the use of BCAs for controlling various diseases in aquaculture and animal husbandry, as well as monitoring and evaluating their effectiveness.
- v. Monitoring and evaluation: This would involve regularly monitoring the health and performance of the fish and chickens in the model farm, as well as evaluating the cost-effectiveness of the BCS-based strategies compared to traditional disease control methods.

4. Output 4: Dissemination of Knowledge Products and Exchange

The consultant will be involved in writing a technical report outlining the findings and recommendations of the study, including a detailed analysis of the efficacy of BCA-based strategies in controlling various diseases in aquaculture and animal husbandry.

This would also entail the sharing of the results of the technical study with farm technicians, veterinary practitioners, and other stakeholders in the aquaculture and animal husbandry industries, as well as with the general public through various channels such as workshops, training and publications.

The consultant/s will also serve as resource persons during training to present the study findings or demonstrate the efficacy of BCA.

5. Output 5: Project Management

The consultant is expected to work closely with the Food, Agriculture and Forestry Division of the ASEAN Secretariat in the implementation of the project. The consultant will be the Implementing Agency will take full responsibility for the utilisation of the fund and will manage it professionally to ensure accountability. The consultant will submit to the ASEAN Secretariat the Project Completion Report (PCR) and Project Financial Report (PFR) accompanied by their summary and supporting documents project being implemented. The Project Completion Report will also include an evaluation highlighting the implementation issues, assessment achieved, progress towards the

achievement of objectives, relevance and performance of the project as compared to the project document, identify and document lessons learned and recommendations.

IV. Tasks and Activities

The following activities will need to be undertaken to achieve the outputs presented above. The bidder should provide details on its approach to each activity in its bid and is free to recommend additional activities.

Deliverables	Activities/Tasks	Indicative Date	Completion	Person Responsible
Output 1. Inception Report	Inception meeting to present methodology, and validate scope, and timelines. Conduct a review of existing literature and research on AMR, the prudent use of antimicrobials, and BCA-based strategies for controlling various diseases in aquaculture and animal husbandry.	Within 1 week after the signing of the Special Services Agreement and Disbursement Letter between ASEAN and the contractor		Contractor, ASEC, JAIF
	Drafting Inception Report which will include: project approach and design, methods and data collection, preliminary findings (literature review) and work plan.	Week 1 – 2		Contractor with inputs from ASEC
	Consideration and approval of the draft Inception Report by ASEAN Sectoral Working Group on Fisheries and ASEAN Sectoral Working Group on Livestock	Week 3-4		ASEC to circulate to the ASEAN Sectoral Working Groups
Output 2: Research on the efficacy of BCA for disease control in aquaculture and animal husbandry.	Design of experiments: This would entail consultation with experts in the field of aquaculture, animal husbandry, and AMR to gather their insights and expertise on the topic. Collaboration with research institutions with the requisite instruments and experience to design experiments to assess the efficacy of BCA-based strategies in controlling various diseases in aquaculture and animal husbandry, including the selection of appropriate experimental groups, sampling protocols, and data collection methods.	Week 1-8		Contractor
	Implementation of experiments: This would involve carrying out the experiments as per the design, including the application of BCA-based strategies and monitoring the health of the aquaculture and animal husbandry	Week 9-36		
	Data collection and analysis: This would involve collecting and analysing data on the efficacy of BCA-	Week 9-36		Contractor

	based strategies in controlling various diseases in aquaculture and animal husbandry, including measures of disease incidence and severity, as well as any other relevant parameters Laboratory and field tests are expected to be carried out on both a common commercial fish species in ASEAN as well as a common commercial broiler or layer species. Efficacy tests would be carried out and challenged against common infection and pathogenic species in the region.		
	Evaluation of the cost-effectiveness of BCA-based strategies in controlling various diseases in aquaculture and animal husbandry, including the costs of applying the BCAs, the costs of treating diseases with antimicrobials, and the costs of any other relevant parameters.	Week 9-36	Contractor
	Development of a technical report that will synthesise the information gathered from the review of literature, consultations with experts, in vitro and in vivo studies, including field trials on the efficacy of BCA in controlling various diseases in aquaculture and animal husbandry.	Week 33-40	Contractor
Output 3: Model farms for showcasing the effectiveness of BCA use in aquaculture and livestock are established	Selection of the location for the model farm: It is important to choose a suitable location that will provide the right environment for the growth and development of the fish and chickens being raised in the aquaculture and animal husbandry industries	Week 4-8	Contractor, Secretariat ASEAN
	Establishment and operation of demonstration farm: This would involve the establishment and operation of the necessary infrastructure for the model farm, including water and feed systems, animal housing, and grow-out tanks for aquaculture.	Week 9-52	Contractor
	Stock selection and management: This would involve selecting the appropriate species of fish and chickens to be raised in the model farm, as well as developing a management plan for feeding, health monitoring, and disease control.	Week 9-52	Contractor
	Implementation of BCA-based strategies: This would involve the use of BCAs for controlling various diseases	Week 9-36	Contractor

	in aquaculture and animal husbandry, as well as monitoring and evaluating their effectiveness.		
	Monitoring and evaluation: This would involve regularly monitoring the health and performance of the fish and chickens in the model farm, as well as evaluating the cost-effectiveness of the BCS-based strategies compared to traditional disease control methods.	Week 9-36	Contractor
Output 4: Dissemination of Knowledge Products and Exchange	Development of a technical report, including a policy brief that will synthesise the information gathered from the review of literature, consultations with experts, in vitro and in vivo studies, including field trials on the efficacy of BCA in controlling various diseases in aquaculture and animal husbandry.	Week 33-40	Contractor
	Circulation of Technical Report to Sectoral Bodies to input	Week 41-42	ASEAN Secretariat and ASEAN Member States
	Conduct Training-Workshop to share the results of the technical study with farm technicians, veterinary practitioners, and other stakeholders. • Discussion of the technical report • Train stakeholders on the application of BCA	Week 43	Contractor ASEAN Secretariat and ASEAN Member States
	Revision of the Technical Report	Week 44	Contractor
	Circulation of the technical report for endorsement of the sectoral bodies	Week 45	ASEAN Secretariat and ASEAN Member States
Output 4: Project Management	Submission of the Project Completion Report (PCR) and Project Financial Report (PFR) to the ASEAN Secretariat. The Project Completion Report should include an evaluation highlighting the implementation issues, assessment achieved, progress towards the achievement of objectives, relevance and performance of the project as compared to the project document, identify and document lessons learned and recommendations.	Week 46-52	Contractor

V. Project Management and Reporting

The selected consultant should coordinate and closely work with the Food, Agriculture and Forestry Division of the ASEAN Secretariat in carrying out the assigned activities. The consultant is expected to produce reports/knowledge products, name: i) Inception Report; ii) Technica Report; iii) Project Completion Report (PCR) and Project Financial Report (PFR) to the ASEAN Secretariat and JAIF in draft format, and following ASEAN Secretariat approval, in final format. All outputs and reports must be suitable for publication, although the decision on publication lies with the ASEAN.

As this project will be supported by the Government of Japan through JAIF, the proponent/IA will follow the Guide on Visibility for JAIF-Supported Projects, including the use of JAIF logos and reference to JAIF support, whenever project outcomes, outputs, and activities have communication and visibility aspects

VI. Scope of Services

The consultancy will be undertaken over a continuous effective period of twelve (12) calendar months. Work will commence immediately after contract signing.

VII. Qualifications

In its proposal, the Consultant(s) should demonstrate:

- Proven track record of successfully implementing agriculture, livestock and fisheries related projects (please provide evidence);
- Have a strong understanding of the ASEAN region, including its business environment and regulatory frameworks,
- Have experience in engaging with a wide range of stakeholders, including government agencies, private sector entities, and MSMEs, Experience in working with the ASEAN Secretariat is considered an advantage;
- Strong project management skills, including the ability to develop and implement detailed project plans, manage budgets and resources, and monitor progress against milestones;
- Have a network of partners and collaborators who can contribute to the successful implementation of the project, including technology providers, research institutions, and industry associations; and facilitate effective engagements for in-country consultation and validation workshops (please provide evidence – CV for Individual Consultant or Company profile for company);
- Proven skills in report writing and conversing in English;
- Have a deep understanding of the application of biological control agents in aquaculture and animal husbandry (please provide evidence);
- The Consultant(s) should mention the number of years of experience they have in the successful use of BCA in animal husbandry and aquaculture and the countries in the ASEAN region they have applied it in (please provide evidence); Having experience (if any) in boosting immunity in the target species with the use of BCA is advantage;
- The Consultant(s) should preferably, submit a suggested program based on commonly farmed species in the ASEAN region.
- The Consultant(s) should state their preference of BCA types for use in the program: Effective microbes, phytobiologicals or other.