



## **MASTS PECRE Final Report: Development of *in vitro* and *in vivo* models for screening potential algal compounds to mitigate Francisellosis in tilapia**

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### **Host Institution:**

Institute of Aquaculture, School of Natural Sciences, University of Stirling, Stirling. FK9 4LA.

### **Hosting Faculty:**

Prof. Alexandra Adams

Head of FishHealth & Welfare

Institute of Aquaculture, School of Natural Sciences, University of Stirling.

### **Background:**

This fellowship aimed to develop the *in vitro* and *in vivo* models for screening potential algal compounds to mitigate francisellosis in tilapia. This fellowship was conducted with a MASTS Professor who has experience in aquatic animal diseases and the fish immunology. The aim of the work was to develop *in vitro* models, using primary head kidney macrophage cultures, to screen a range of algal-derived compounds for activity against *Francisella noatunensis* subsp. *orientalis* via phagocytic and respiratory burst activity techniques. *In vivo*, an immersion challenge model was developed for testing specific compounds in fish. This exchange has enhanced international collaboration between the MASTS community, Stirling University and Faculty of Veterinary Science, Mahidol University and contributes new collaborative links with Scotland and Thailand.

### **Interaction with the MASTS community:**

During the fellowship visit to Scotland, I was an active member of the institute of Aquaculture, University of Stirling, a MASTS institution. The interaction on project twas with Prof. Alexandra Adams, Dr. Andrew Desbois and Miss Winarti Sarmin ( a Ph.D student at Stirling) . I also had the opportunity to work with other research groups such as the bacteriology and molecular groups. Moreover, I had a chance to learn the technique for developing a primary cell to cell line by transfection from Dr. Bertrand Collet, who is a senior research scientist form Marine Scotland Science, Marine Laboratory, Aberdeen. I also took the opportunity to introduce MASTS and University of Stirling to the Faculty of Veterinary Science, Mahidol University research community to build up the collaboration in Thailand.

### **Outputs completed and expected:**

#### **1. Development of *in vitro* and *in vivo* models for screening potential algal compounds to mitigate Francisellosis in tilapia:**

The exchange enabled the fellow to gain skills in: isolation, culturing and identifying *Francisella noatunensis* subsp. *orientalis*, diagnostic methods (immunohistochemistry, immunofluorescent and qRT-PCR) and developing isolation head kidney macrophage primary cell for *in vitro* work to screen the algal compounds. In addition, the bactericidal activity of the algal compounds against the *Francisella noatunensis* subsp. *orientalis* was tested. Moreover, an *in vivo* immersion challenge model for *Francisella noatunensis* subsp.

*orientalis*. was developed which can help to test the effect of the algal compounds to improve the immune system in tilapia.

## **2. Impact of Development of *in vitro* and *in vivo* models for screening potential algal compounds to mitigate Francisellosis in tilapia:**

*In vitro* assays have a very high impact to animal welfare by reducing the number of fish used in experimentation as compound can be pre-selected prior to *in vivo* testing. *In vivo* work helps to investigate the real situation of the algal compounds in the live animal. During this fellowship, the fellow discussed some ideas for research collaboration between Faculty of Veterinary Science, Mahidol University, Thailand and Institute of Aquaculture, University of Stirling, Scotland and research proposal has been written and will be submitted shortly (see future plans below).

## **3. Enhancing collaborations between two universities:**

The exchange visit contributes the collaborations between Stirling University, the the MASTS community and Mahidol University, Thailand in term of technology transfer and impact. Moreover, an MOU between Faculty of Veterinary Science, Mahidol University, Thailand and Institute of Aquaculture, University of Stirling, Scotland was developed and is currently being processed.

## **Future plans for building on the PECRE support:**

The collaborations and interactions between the Faculty of Veterinary Science, Mahidol University and the MASTS community will continue in the future. Prof. Alexandra is already collaborating on the development of a new research proposal 'Survey of the emerging disease "Francisellosis" in tilapia aquaculture and development of an *in vivo* co-infection challenge model for investigation of the Tilapia immune system in Thailand.' This project will be submitted to the Thailand Research Fund (TRF).

## **Award size and expenditure:**

Total Award £7,500

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