



Name; Karthikeyan Adhimoolam

Subject ; Curcumin-nanospheres as a feed additive to improve the pig's growth performances and health

Host Institution: Massachusetts General Hospital and Harvard Medical School, Boston, Massachusetts, United States.

Host collaborator; Dr. Hak Soo Choi

The dates of your fellowship; 01.11.2021 to 12.12.2021

I, Karthikeyan Adhimoolam, consent to this report being posted on the Co-operative Research Programme's website.

**1. What were the objectives of the research project? Why is the research project important?**

The proposed research project's main objective was to develop and characterize the curcumin nanomaterials. In livestock, curcumin has been used to improve growth performance, egg quality, meat quality, enzyme activity, and anti-oxidative state. However, curcumin's applications can be challenged by its low water solubility, poor bioavailability, and rapid metabolism. If the challenges are overcome, curcumin-based supplementary diets for live stocks may be on the horizon. Encapsulating curcumin into nanoformulations (nanocurcumin) helps to overcome its drawbacks.

**2. Were the objectives of the fellowship achieved?**

The main objectives of the research project were achieved. The teamwork is ongoing, hence there will be more chances to continue and evolve the research project.

**3. What were the major achievements of the fellowship? (up to three)**

1. We have successfully developed the nanomaterial, curcumin nanospheres, and characterized its particle size and zeta potential.
2. We have also examined the curcumin nanospheres solubility, encapsulation efficiency, and loading capacity.
3. We have injected curcumin nanospheres conjugated medical dye(s) in the mouse and studied the biodistribution of curcumin nanospheres in the mouse.

**4. Will there be any follow-up work?**

We anticipate a long-term collaboration between the two research teams as a result of this fellowship. In the future, we will investigate the curcumin nanospheres effect as a supplementary diet on farm animal's growth performance and health. Also, we will evaluate the therapeutic benefits of curcumin nanospheres in human diseases.

**5. How might the results of your research project be important for helping develop regional, national or international agro-food, fisheries or forestry policies and, or practices, or be beneficial for society?**

Livestock production is an important source of livelihood for the resource-poor farmers in rural areas. It is also the major source of food and food products and a source of income. However, livestock productivity in the rural areas is below their genetic potential, mainly because of inadequate nutrition, poor reproductive management, and diseases. After supplement research, the curcumin nanospheres (nutraceutical candidate) developed from our project will be a potential feed additive for live stocks. It will allow improving the livestock production in terms of better animal growth and health. An upsurge in livestock production helps to increase the farmer's income in the rural areas.

**6. How was this research relevant to:**

**CRP objectives**

This Cooperative research project offered the cutting-edge scientific knowledge with results that may be transferable to applied science, particularly in the field of agriculture and livestock management. The long-term teamwork among two research group is guaranteed as well.

**CRP research theme**

Our research project is associated directly with the CRP research theme “Transformational Technologies and Innovation”. The research has significant social and economic impacts as it focuses on increasing the production of farm animals and income of farmers.

**7. Satisfaction**

I am convinced that this Co-operative research fellowship is an excellent opportunity to improve my career and lead to new research collaboration and academic output.

## **8. Advertising the Co-operative Research Programme**

I learned about the Co-operative research programme from my institute's scientists. The programme needs more advertisements on different scientific platforms and social medias to get scientist's attention. I have not faced any issues, the fellowship was good and successful. I would like to thank the OECD for its immense support.