



# Improving food and feed production by utilizing insects fed with food and feed wastes

We aim to solve the problems associated with global food shortage by integrating domestic and international efforts that advance technologies for insect production. This project should be super-accelerated by gathering wisdom across generations with innovative minds from academic, industrial and governmental sectors. We will promote complementary and synergistic interdisciplinary collaboration and realize social innovation by launching start-up businesses. We aim to build a closed-cycle food production platform that will ensure humanity's unprecedented growth.

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## Development of Insect-Based Sustainable Food Production Systems for Global Food Security and Human Space Exploration

**Keywords:** insect domestication, multiomics, highly functional food, fishmeal substitute feed material, fishery environmental management, space food production

### Background

Insects have potential for solving the protein crisis

The current pace of worldwide population growth will imminently face a protein crisis, a situation in which the demand for dietary protein exceeds the supply. Insects have garnered considerable attention as new protein sources with low environmental impact. We will solve the protein crisis through the development of a sustainable mass production system of high-quality insects for human food and animal feed.

### Research Contents

Food production based on waste-recycling insect feed

This project will develop insects that can convert crop residues and food wastes, among other sources, into useful proteins and introduce them as raw materials for marine and livestock feed by 2030. The insects are utilized as a new biological resource to support human food, health, and the global environment. The project will develop insect production systems available to any environment on Earth by 2040. Furthermore, we aim to advance to closed-cycle food production platforms that provide safe, secure and healthy food even in space by 2050.

#### Insect Breeding

Genome editing, breeding, and selection for insect production

#### Core Technology Development for Space

Insect production system for human food in space



#### Sustainable Insect Production System

Development of safe and environment friendly insect production systems

#### Feed for Fishery and Farming from Insects

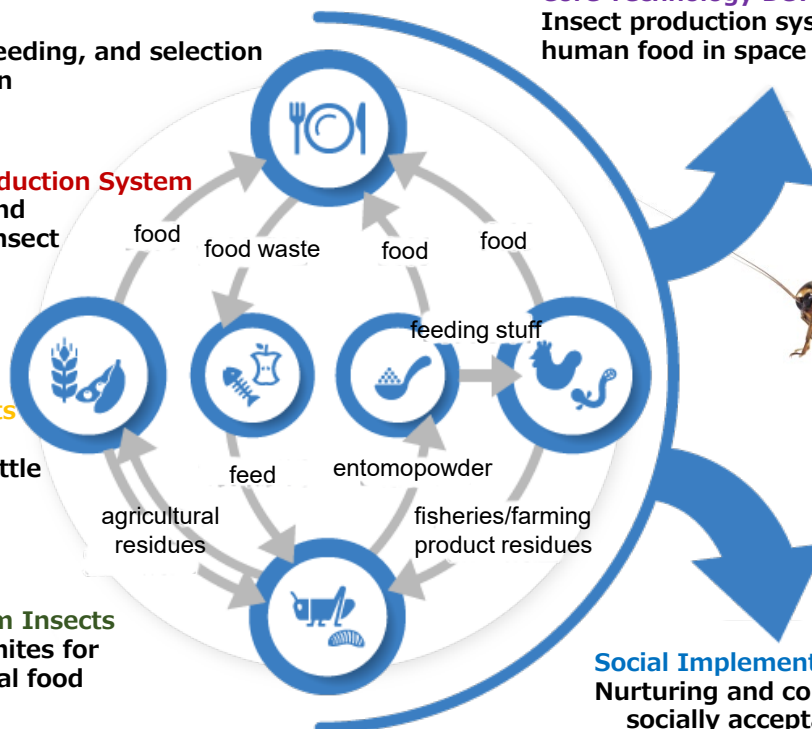
Insects for the next-generation feed for cattle and aquaculture that replace fish meal

#### Food Derived from Insects

Crickets and Termites for safe and functional food

#### Social Implementation

Nurturing and construction of socially acceptable new industries



## Targets by 2030

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By 2030, we aim to achieve the following targets:

- (1) Establish production package of crickets, fish feed from black soldier flies, and poultry feed from termites.
- (2) Establish a sustainable mass production system for high-quality insects.

## Cooperating Research Institutes

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Ochanomizu University, Tokyo University of Agriculture and Technology, Tokushima University, Nagahama Institute of Bio-Science and Technology, Waseda University, Fisheries Research and Education Agency, National Agriculture and Food Research Organization, University of Human Environments, RIKEN, Tokyo University of Marine Science and Technology, The University of Tokyo, Shizuoka Prefectural Research Institute of Fishery, Kyoto University, Yamaguchi University, Hamamatsu University School of Medicine, Niigata University, Hiroshima University



Moonshot Research and Development Program for agriculture, forestry and fisheries [Project Overview]