



## Our Business Plan:

# Securing the Future with Sustainable and Organic Feed for Free Range Antibiotic-Free Poultry

**Utilizing Alternative Protein Source and Locally Available  
Ingredients**

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# Executive Summary

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Satoyama Farm Sdn Bhd (Satoyama), a wholly-owned subsidiary of Satoyama Agritech Ltd., is a bio- and agri-technology company based in Kuching, Sarawak, Malaysia. It focuses on formulating sustainable and organic feed using local ingredients and alternative protein source for free range antibiotic-free poultry.

## Achievement Highlights

- **Precision Feed Formulation** – Our R&D has successfully formulated our feed using alternative protein source (black soldier fly larvae) to produce poultry that are healthy and with high nutritional value. We are currently producing the poultry feed in pellet form
- **Antibiotic-Free Poultry** – Our slow-growing poultry (minimum of 60 days) is reared in the free range without using antibiotics or artificial growth promoters. We have proven that poultry can grow well using our local herbs and plants based wellness supplements.
- **Better Poultry Meat Quality**– Our free range husbandry methodology is successful in producing poultry with firmer and juicier meat with more flavorful taste.
- **Rural Economic Transformation for Sarawak** –As a social enterprise, Satoyama is taking affirmative steps to fast track rural economic transformation using the contract farmer model. For a start, it has signed with contract farmers to produce free range antibiotic-free poultry using Satoyama’s proven methodology. Contract farmers will be expanded to other business areas such as organic plantations for bamboo and local herbs as well as black soldier fly production in due course.

## Vision

- Pursue Food Security and Food Safety with Circular Agriculture

## Mission

- To develop and produce effective animal nutrition using sustainable alternative protein source augmented with local herbs

## Strategy

- Joint R&D efforts with Government Research Agencies and Institutions to formulate poultry feed and wellness supplements
- Cultivate contract farmers in the rural communities for the production of free range antibiotic-free poultry, organic plantation for local herbs and bamboo and insect protein
- Develop global distribution channels for free range antibiotic-free poultry reared with sustainable and organic poultry feed

## Objectives

- Promote science-based solutions to ensure sustainability and traceability
- Comply with balanced regulatory framework and adoption of international standards and global equivalency
- Create culture of Research and Development mindset for younger generation to venture into agriculture industry
- Create potential income source for rural population using sustainable agriculture

## Key Targets by 2023

- Production of Black Soldier Fly Larvae Per Month – 17,000 tons
- Satoyama Feed Production Per Month – 17,000 tons
- Satoyama Poultry Production Per Month via Contract Farmers – 100,000 birds (target year – 2022)

# In Pursuit of Food Security and Food Safety

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## Global Problem: Food Security and Food Safety

The world population is estimated to increase at an alarming rate of 23% to 10 billion in 2083 (United Nations and US Census Bureau). As countries become more developed and affluent, their populations also increase the demand for meat consumption. Current production of animal protein is in direct competition with human as both consume large quantity of corn and soybeans.

The production of corn and soybeans will not be able to meet the increased demand by both human and animals; creating a global problem of food security.

Food safety is another global issue as countries in the tropical zone need to import the corn and soybeans grown in the temperate region. Long haul transport and storage of the corn and soybeans may cause contamination by mycotoxins in the hot and humid conditions which have serious consequences on bird performance and the safety of poultry products for humans. In addition, the increased use - and abuse - of antimicrobial medicines in both human and animal healthcare has contributed to an increase in the number of disease-causing microbes that are resistant to antimicrobial medicines used to treat them, like antibiotics.

## Satoyama's Solution – Sustainable and Organic Feed and Free Range Antibiotic-Free Poultry

To meet the need for substantial demand for meat protein, we advocate a more efficient production of meat protein which is poultry meat. Poultry is relatively more efficient to produce when compared to cattle or swine. It takes 1.7 kilogram of feed to grow one kilogram of the body weight of a chicken ie the Feed Conversion Ratio (FCR) is 1.7:1. The FCR for cattle is 7:1 and it's 2.7:1 for swine.

Part of our solutions is not to use imported corn and soybeans for animal feed and replace them with insect protein (*black soldier fly*) augmented with other sustainable raw ingredients that are more sustainable and available locally (*bananas and bamboo fiber*). Black Soldier Fly (BSF) is an ideal ingredient as we can customized its feedstock to derive the exact nutrients required for optimal performance for poultry. BSF also consumes large quantity of food and solid waste and plays an important role in our principle of reducing food and solid waste. Bananas, a tropical fruit is found abundantly in Sarawak and is an excellent source of carbohydrates while bamboo fiber enhances digestibility of nutrients by the chickens.

In addition, we do not use antibiotics or artificial growth promoters for our free range poultry. We formulate our own wellness supplements for the poultry's health and well-being. These supplements also act as natural growth promoters.

# Key Success Factors

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## **Abundant Land and Human Resources**

Satoyama's homeland is Sarawak, Malaysia; located in the island of Borneo, one of the last frontiers of uncontaminated pristine land with rich biodiversity. Sarawak is the largest state in Malaysia with an area of 124,451 sq km. It has abundant of under-utilized land for agriculture that can be further developed. According to the Department of Statistics Population Estimates in 2017, Sarawak has a population of 2,766,300 with a majority them working on their own small holding farms.

## **Geographical Advantage**

.Geographically, Borneo is located at a strategic area where it is outside of the volcanic and typhoons paths. This gives us the added assurance of the ability to do business without worrying of volcanoes and typhoons. In addition, Borneo is located in the equator with hot and wet seasons and hence, production and cultivation can be carried out throughout the year.

## **Proven Methodology of Using BSF, Bananas and Bamboo Fiber**

Another key success factor is that the key ingredients of our feed; black soldier fly, bananas and bamboo fiber, are already proven scientifically as ingredients for animal feed. We are merely taking it one step further by combining all three into one precision formula.

## **Success of Satoyama's Precision Feed Formulation**

Based on our numerous experiments, we have formulated the formula that proves to be successful. We are now producing the precision formula in pellet form and improving it with further R&D.

## **Potential to Upscale for Industrial Commercial Production**

In any R&D and product development efforts, they must be translated to industrial production. We have put in place relevant machinery and SOPs.

## **Design, Fabrication, Testing and Commission of Organic Milling Machinery**

Currently, Hosokawa Engineering is working with us on the design of the organic milling machinery for upscaling and industrial production of the sustainable and organic feed for large scale commercial production.

## **Acceptance of Insect, Banana, Bamboo and Natural Tonics by FAO and EU**

Another key success factor is that Food & Agriculture Organization and European Union have both relaxed their rulings regarding insect proteins and other ingredients for animal nutrition rather than depend solely on corn and soybeans.

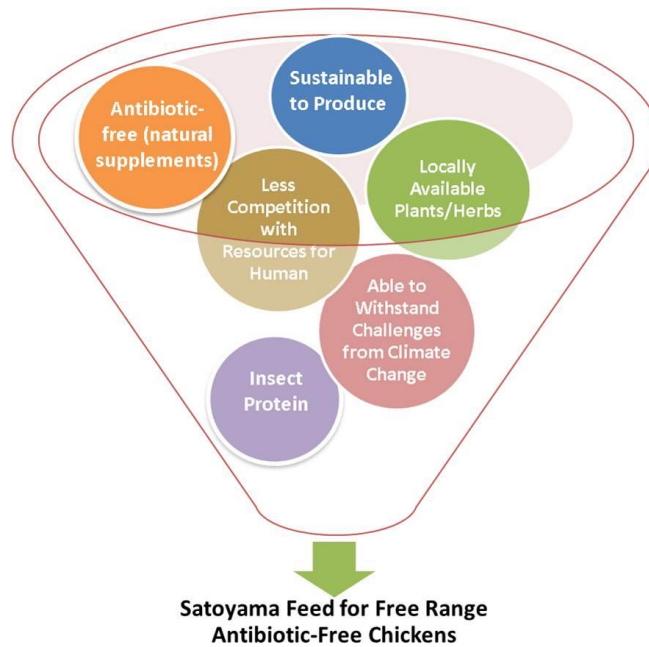
## **Worldwide Market Demand for Sustainable and Organic Feed and Free Range Antibiotic-Free Poultry**

As the world population increases, there is a huge market demand for sustainable and organic feed and safer meat protein.

# Milestones

## Research & Development (R&D)

R&D plays a critical role in our quest for precision animal nutrition that is sustainable to produce and organic. We are in search of raw ingredients that must fulfil the following:



In order to achieve our quest, we start from organic compost to feedstock technology (Please refer to the below R&D Roadmap).

## R&D Road Map to Sustainable and Organic Feed for Free Range Antibiotic-Free Poultry



## **Organic Compost**

In organic compost, we have two key milestones to achieve:

- a) Identification of cellulase to degrade EFB (empty fruit bunches) fiber in order to accelerate the composting period  
Collaborator: University of Technology Malaysia, Sarawak Branch  
Length of R&D: From Q3 2018 to Q1 2020
- b) Isolation of Trichoderma to degrade the EFP and improve finished compost quality  
Collaborator: Sarawak Biodiversity Centre  
Length of R&D: Q4 2018 to Q2 2020

## **Organic Herbs and Crops**

Our R&D in organic compost in turn helps us in more productive cultivation of organic herbs and crops for our wellness supplements. As we do not use antibiotics and artificial growth promoters for our poultry, we need to ensure that our herbs and crops are also without pesticides and synthetic chemicals.

When the various herbs and crops are formulated into our Wellness Supplements, there is always the challenge of quality and shelf-life.

- a) Bioactive Components Identification in Herbal Tonic and Potential for Commercialization  
Collaborator: Dr Leong Sui Sien, Putra University of Malaysia, Bintulu, Sarawak  
Length of R&D: From Q2 2019 to Q3 2021
- b) Effects of Packaging Methods and Storage time on Therapeutic and Microbiological Quality of Dried Herbs  
Collaborator: Dr Phebe Ding, Putra University of Malaysia, Bintulu, Sarawak  
Length of R&D: From Q2 2019 to Q2 2022

## **Bamboo Fiber**

Bamboo has been proven by numerous scientific researches as an excellent source of fiber in poultry feed. A renewable energy, bamboo also helps to mitigate carbon sequestration. It is one of the key ingredients in our formulation.

- a) Digestibility of Bamboo fermented by Lactic Acid Bacteria (LAB) for Poultry  
Collaborator: Prof Loh Teck Chew, Putra University of Malaysia, Serdang, Selangor  
Length of R&D: From Q2 2019 to Q4 2019  
Target: Upon completion of the study, we will be able to utilize even more precise amount of bamboo fiber for our feed

## **Black Soldier Fly (BSF)**

Black Soldier Fly (BSF) is our main ingredient for our sustainable feed. BSF is being used as animal feed especially in the South East Asia region. Since the European Union has permitted the usage of BSF in animal feed, it has grown in popularity.

As the “star” of our precision feedstock, BSF Larvae (BSFL) is our focus in our R&D efforts.

- a) **Produce Lactic Acid Bacteria (LAB) to improve Bamboo Digestibility for the BSFL**  
Collaborator: Dr Ang Chung Huap, University of Technology, Malaysia, Sarawak Branch  
Length of R&D: From Q3 2018 to Q2 2020
- b) **Digestibility testing for BSFL with different Diets**  
Collaborator: Professor Loh Teck Chwen, Putra University of Malaysia, Serdang, Selangor  
Length of R&D: From Q2 2019 to Q4 2019
- c) **Defatting BSFL with Screw Press to Reduce Fat Content**  
Collaborator: Professor Clement Kuek, Curtin University, Miri  
Length of R&D: From Q2 2019 to Q3 2020
- d) **Characterization of BSFL By-Products after Defatting (Pressed Cake and Oil Extracts)**  
Collaborator: Professor Clement Kuek, Curtin University, Miri  
Length of R&D: From Q2 2019 to Q3 2021
- e) **Composition of BSFL Feedstock Using Locally Available Ingredients (In-House Projects)**
  - i. Determine composition using Groundnuts, Water Hyacinth, Napier Grass and Chicken Innards
  - ii. Determine composition using Fermented Bamboo, Palm Kernel Meal (PKM), Spinach and Chicken InnardsLength of R&D: From Q1 2019 to Q4 2019

## **Feedstock Technology**

There are two main categories of milestones:

### **Feed Formulation**

In terms of feed formulation, we are now at the stage where it is more on enhancing our proven formula and seeking other alternative protein and carbohydrate sources as well as more precise formulae.

- a) **Precision Feed Formulation using Local Ingredients**  
Collaborator: Dr William Riley, University of the Philippines



Length of R&D: From Q2 2019 to Q2 2020

- b) Using Algae as Alternative Protein Source  
Collaborator: Sarawak Biodiversity Centre, Chitose & Mitsubishi Corp  
Length of R&D: From Q3 2019 to Q4 2020

#### Feed Mill Machinery

- a) Optimization of Machine Settings for Large Scale Production of Feed  
Collaborator: Mr Tok Chen Hong, local inventor and Hosokawa Engineering  
Length of R&D: From Q2 2019 to Q2 2020

# Alignments with UN SDGs



In line with its vision of pursuing food security and food safety with circular agriculture, Satoyama is on track with its social responsibility of aligning its achievements with United Nations Social Development Goals (SDGs).

a) No Poverty / Decent Work and Economic Growth

Satoyama plays an active role in the rural economic transformation of initiated by Sarawak Government. Through its contract farming program, Satoyama brings employment opportunities and stable income to the relatively under-developed and under-employment rural community.



b) Good Health and Well-being

Our free range and antibiotic-free chickens are also slow growing with up to minimum of 60 days before harvesting. Fed with our special feed and wellness supplements, our chickens have higher nutritional value than commercial fast-growing chickens. We use locally available ingredients for our feed to minimize mycotoxin contamination.



c) Responsible Consumption and Production

We practice sustainable circular agriculture in as many areas as possible; converting food waste and solid waste into feed for our BSFL.



d) Life on Land

We also use solid waste such as empty fruit bunch (EFB) from oil palm for our organic compost.



e) Climate Action

We advocate the production of poultry as it is a more environmentally-efficient alternative source of meat protein. Poultry production emits lesser carbon footprint. We also contribute towards lesser carbon footprint as we are not using imported corns and soybeans. Instead we use locally available ingredients.



We are a member of *4 per 1000* and subscribe to its principle of putting organic matter back to the soil. This not only stabilizes the climate but also to ensure food security, i.e. to provide food in sufficient quantity.

# Key Management

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## Management by Digital Solutions

In order to manage the various departments especially the R&D data and records, Satoyama uses web-based solutions developed a local Sarawak IT company. Datapuri Farm Operation System covers the entire operations of the farm, poultry husbandry, planting, R&D, inventory and so forth.

## Key Management Team

NAME	DESIGNATION
PETER YAP SENG	CHIEF EXECUTIVE OFFICER
AGATHA LAU NGUOK SING	CHIEF OPERATING OFFICER
MARGARET YAP	GENERAL MANAGER
JESSICA WONG	FINANCE MANAGER
JULIAS JONDENG	FARM MANAGER
DORIS LAYAU	R&D SUPERVISOR