



Technologies for smart bio-industry and agriculture

Realization of "food" sustainability through next-generation bio-industry and agriculture

With the theme of "food" sustainability, a "smart food system" model will be built where the smart food chain platform will be the core centered on data linkage as an infrastructure that transforms the conventional chain-type business model of "creating," "forming" and "selling" into a cyclical type.

In this way, the "individual field-specific" approach shall be transformed into a "cross-disciplinary" approach with the solution vector pointing to "circulation" while solving a wide range of issues.



Program Director

KOBAYASHI Noriaki

Kirin Holdings Co. Ltd.

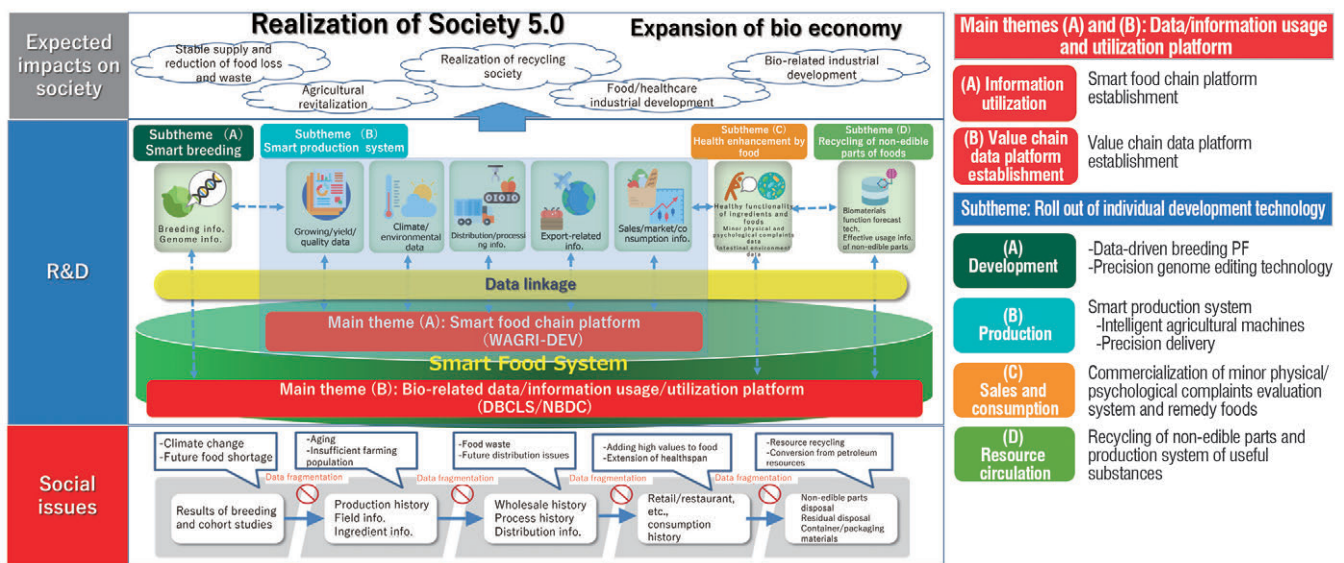
Director of the Board, Senior Executive Officer

Member of the Government's Bioeconomy Strategy Council

Profile

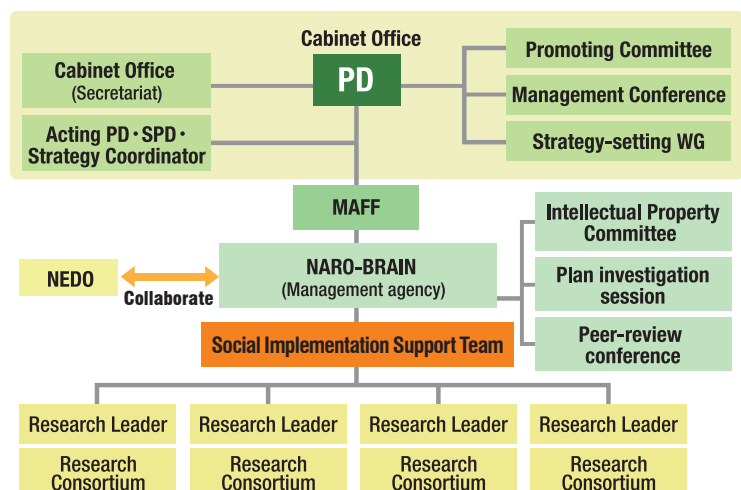
Mr. KOBAYASHI graduated from Mie University in 1983. He joined Kirin Brewery Company in the same year. He was named General Manager, Production Department, Logistics Division, Kirin Beverage Company, Ltd. in 2010, and named Executive Officer, General Manager, Technology Management Department, Research & Development Division, Kirin Company, Ltd. in 2014. He was appointed the Program Director for the SIP "Technologies for smart bio-industry and agriculture" in 2018. In 2019, he serves as the Director and Senior Executive Officer of Kirin Holdings Co. Ltd. He is also a member of the Government's Bioeconomy Strategy Council.

Research and Development Topics



Implementation Structure

We conduct research by constructing a consortium consisting of universities, national research institutes, and enterprises etc. for each research theme, so that we can tackle research and development from basic to practical use. Each research consortium promotes research, so that synergistic effects can be exerted by closely coordinating between members and consortium, under guidance and advice of PD or Sub-PD etc. We have set up a social implementation support team directly under PD from 2021 in order to accelerate the concrete implementation of social implementation. The team specifically supports the activities of the research representative and the person in charge of social implementation, such as identifying tasks up to implementation and creating a process chart, preparing a commercialization plan and executing its promotion.



Cross-ministerial Strategic Innovation Promotion Program (SIP)

Exit Strategies

✓ Practical application of data linkage platform (Smart Food System)

Businesses such as IT vendors build and provide various food-related services by utilizing data/information linkage platform of the “smart food chain platform” built on the WAGRI-DEV. Agricultural and food-related businesses, which are the end users, utilize them to realize the development of value-added farm/processed products, high-quality assurance, streamlining of logistics, and reduction of disposal loss of farm products by precision shipping prediction.

Also, a scheme to solve the issue of uneven distribution of foods by data utilization and reduce food loss and waste by linking “excess” and “necessity” shall be established.

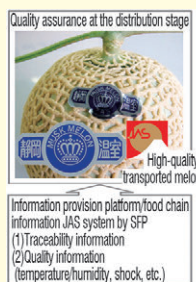
✓ Practical application of the results of efforts to address individual issues

For issues to supply products/services to the market as a composition theme’s individual research results, companies participating in each consortium or partner companies will put them into practical use. For platform-type research results that are widely used by public and private sectors such as a system to support food value chains, practical application shall be achieved by companies participating in each consortium and by widely solicitating new business ideas.

Past Milestones and Anticipated Outcomes

Data linkage Smart food chain platform

- Establish a comprehensive information linkage platform (WAGRI-DEV) by standardizing product identification code, API, and prototype development of Viewer.
- Demonstrate services such as quality assurance by disclosing distribution and storage information of fruits and vegetables, export promotion by guaranteeing production and shipping history or by imparting high tamper resistance using blockchain, and distribution efficiency improvement by sharing shipping information.



With improved efficiency through joint distribution and supply/demand matching, etc., realize cost reduction, food waste and loss reduction. Provide distribution system that adds traceability, added value improvement of farm products by quality assurance and breeding process data control solutions.

Development Breeding streamlining

- Established data-driven breeding platform to acquire, accumulate and analyze breeding data. Built and demonstrated a model that predicts traits in fruit trees and vegetables. For example, the average fruit weight of strawberries can be selected at the seedling stage, and the number of individuals 10 times larger than before was evaluated.
- Already developed Cas9 variant with a high degree of freedom in recognition sequence and alien DNA-free genome editing technology.

Average fruit weight almost doubled in the first cycle of selection



The breeding period and cost of developing high-value-added varieties that meet the market and export needs have been significantly shortened.

Production Smart agricultural production

- For intelligent agricultural machines that can be moved between fields by remote monitoring, prototypes of remote monitoring and self-position estimation technologies have been constructed, and operation verification and demonstration have been completed on-site.
- Developed a prototype of cabbage precision shipping forecast system. Confirmed 10% profit improvement by reducing harvest loss.

Recognizes obstacles and automatically stops



Contributes to improving productivity and profits at farms by reducing agricultural production costs and working hours and reducing waste loss.

Sales/Consumption Healthcare industrial development by food

- Extracted intestinal microbiota characteristic to Japanese people from intestinal microbiota bacteria analysis that correlates with food
- Analyzing the relationship between minor physical/psychological complaints and diet and lifestyle, including labor productivity

Implementation of Sukoyaka health survey

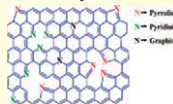


We created new services and products to improve minor physical/psychological complaints and contribute to health maintenance. We also contributed to the development of the healthcare industry by utilizing intestinal microbiome data and functional ingredient data in food.

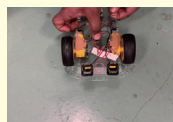
Resource circulation Utilization of unused farm resources

- Developed technology to manufacture more than 10 kinds of high-value-added new materials and new chemicals from unused farm resources for the supply of bio-derived C6 sugar at 30 JPY/kg.
- Developed a process to produce the highest heat-resistant plastic (bio-PBI) in history, derived from biotechnology.
- Achieved high-speed charging/discharging of lithium-ion batteries (fast charging in 9 minutes) by using this bio-PBI material as a negative electrode active material.

Rapid charge/discharge using calcined PBI as the negative electrode of Li-ion secondary batteries



High concentration nitrogen doped hard carbon



Example of demonstration using the battery made of bio-PBI material

Build a biomaterial market by developing innovative biomaterials and high-performance chemicals by using non-edible parts of foods, and recycle unused parts of farm products.