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

What is expected in biotechnology and agriculture technologies now is a contribution to realize global sustainability with efforts integrating digital technologies. Especially, their potential to contribute to "clothing", "food" and "housing" is so significant that these technologies are indispensable to realize such sustainability.

For sustainability of the global environment and resources with the theme of "food sustainability", we aim to build an infrastructure for application of data and information on "food"-related research and development required for the "Smart Food System" that comprehensively realizes the following:

1. Sustainability of agriculture
2. Sustainability of ingredients and foods
3. Sustainability of "food"-related resources and environment

Specifically, we will link food "development", "production", "processing", "distribution", "sales", "consumption", and "resource circulation" cyclically by collecting and using data and information at each stage. By matching seeds and needs of supply and demand sides, we present a model case called the "Smart Food System" aiming at the emergence of "food"-related business beyond the framework of each industry, including:

- Streamlining of farming / improvement of farm management efficiency
- Reduction of food loss and waste
- Value-added ingredients and food
- Development of primary industry by increasing export
- Reusing or recycling of unused parts of waste and farm products after consumption

We will propose and socially implement a distribution infrastructure model of "food"-related information, which is rare in the world, in order to contribute to the sustainability of global environment and resources, as well as research results for each research stage.

Cross-ministerial Strategic Innovation Promotion Program (SIP)
Past Milestones and Anticipated Outcomes

**Sustainability of global environmental resources**
- **Sustainability of ingredients and food**
  - Reduction of waste at domestic or overseas complementary distribution stage
  - Value-added foods satisfying market needs
  - Recycling of non-edible parts and residues as resources and materials
  - Enhancing functions of food-based biomaterials and adding high value to them
  - Reduction of environmental burdens of bio-related industries

**“Food” sustainability in next-generation bio-industry and agriculture**
- **Agricultural sustainability**
  - Operation with less manpower
  - Reduction of environmental burden
  - Increase of new farmers

**Production**
- Automation of farming
- Automation of operational instruction
- Stabilization of farm management

**Development**
- Roll out of data-driven breeding
- Application of genome editing

**Resource circulation (recycling)**
- Creation of genome library for making breeding efficient
- Succeeded in establishing a new method for genome editing as new breeding technology
- Creating a library of soil eco-system for setting a new evaluation standard of agriculture

**Consumption**
- The performance target of the method to extract useful materials from non-edible parts (rice straw, rice hull, etc.) was achieved
- Proposed thermal-proof polymer made from biomaterials
- Succeeded in experimentally producing lithium ion battery with PBI

**Sales and consumption**
- Roll out of functional ingredients and foods
- Increase of export

**Smart Food System**
- Creating a model of relationship between foods mainly consisting of farm products and indicator for minor physical and psychological complaints
- Finding intestinal flora specifically found in Japanese people by analyzing correlation between food and intestinal bacteria