January 31, 2024

Toyota Technical Development Corporation

SoftBank Corporation

Technical Validations of Livestock Raising Technologies for Optimizing Feed Quantities and Delivery Timings

– Visualization of Cattle Growth Process Using Image Analysis AI and Sensing Technologies –

Toyota Technical Development Corporation (TTDC, Head Office: Toyota, Aichi, President: Yoshiyuki Kagawa) has concluded a joint development contract with SoftBank Corporation (Head Office: Minato-ku, Tokyo, President & CEO: Junichi Miyakawa) related to digitalization (DX) of the livestock raising process. Under this agreement, the two companies are currently working to validate technology developed to optimize cattle feed quantities and delivery timings. These technical validations have been adopted by both the Try Angle Ehime project, which is aiming to accelerate the implementation of digital technology in Ehime Prefecture, and the 2023 Foodtech Business Demonstration Project run by the Japanese Ministry of Agriculture, Forestry and Fisheries (MAFF).

Background

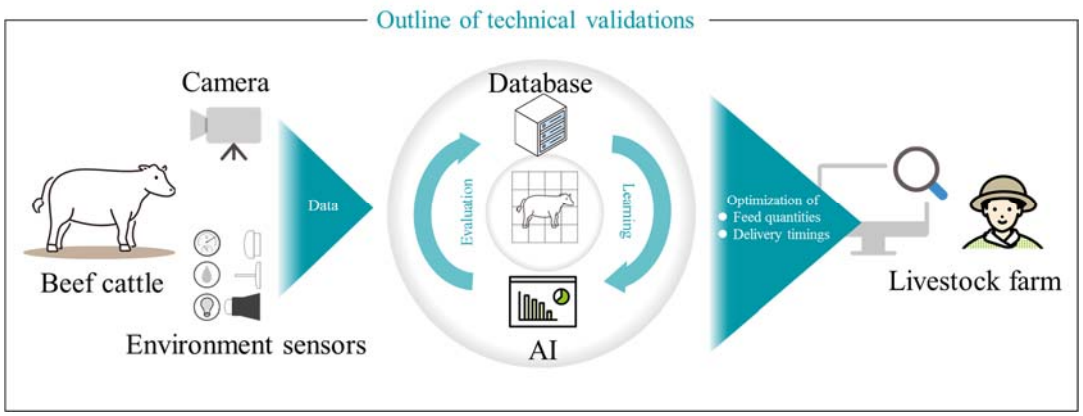
Rapid global population growth is likely to further stimulate demand for both animal and agricultural food products. At the same time, on a calorie supply basis, Japan has a food self-sufficiency of only 38%[*1], the lowest of any developed country, and is facing growing concerns about its food security. Livestock farms are heavily reliant on imports of feedstuff. As feedstuff accounts for more than half of running costs, farmers are highly vulnerable to the ongoing spike in commodity prices. The cattle industry is also under pressure to reduce greenhouse gas emissions as part of efforts to realize environmentally friendly and sustainable food systems in society as a whole. Surveys of livestock producers have also identified the following issues.

- Feed is delivered to the cattle by hand and feed quantities are not quantitatively tracked.
- The provision of feed to cattle throughout the growth process tends to depend on the experience of the feeder and is not standardized.
- Cattle growth is difficult to gauge using measures or scales, meaning that growth is not measured on a frequent basis.

Reflecting this situation, current methods of livestock feeding are susceptible to waste, preventing farmers from quantitatively determining the best delivery timings for their cattle. Consequently, technology developed to optimize cattle feed quantities and delivery timings is being validated with the aim of resolving these issues faced by producers. By resolving these issues, it should be possible to raise the productivity of the livestock raising process, thereby helping to reduce greenhouse gas emissions by shortening the fattening period.

Project outline

In these technical validations, cameras and environment (temperature, humidity, and brightness) sensors are being used to obtain data about how beef cattle feed, as well as an overview of actual cows. Artificial intelligence (AI) is applied to visualize cattle growth by identifying individual cattle, understanding feeding states, and estimating weight. The ultimate purpose of this process is to optimize feed quantities and delivery timings to help raise the productivity of cattle farms. Currently, these technical validations are being carried out at two locations with an active livestock industry: Yuboku Co., Ltd. (CEO: Shinya Okazaki) in Seiyo, Ehime Prefecture, and Eda-Livestock Co., Ltd. (CEO: Tomoki Eda) at the Eda Cattle Ranch in Takaharu, Miyazaki Prefecture.



Roles

- **Yuboku Co., Ltd.**

Yuboku Co., Ltd. is responsible for providing the environment to implement the validations, as well as specialist assistance for improving the livestock raising process and systems based on the results of data analysis.

(Through Yuboku Co., Ltd., these technical validations have been adopted by the Try Angle Ehime project, which is aiming to accelerate the implementation of digital technology in Ehime Prefecture.)

- **Eda-Livestock Co., Ltd.**

Eda-Livestock Co., Ltd. is responsible for providing the environment to implement the validations, as well as specialist assistance for improving the livestock raising process and systems based on the results of data analysis.

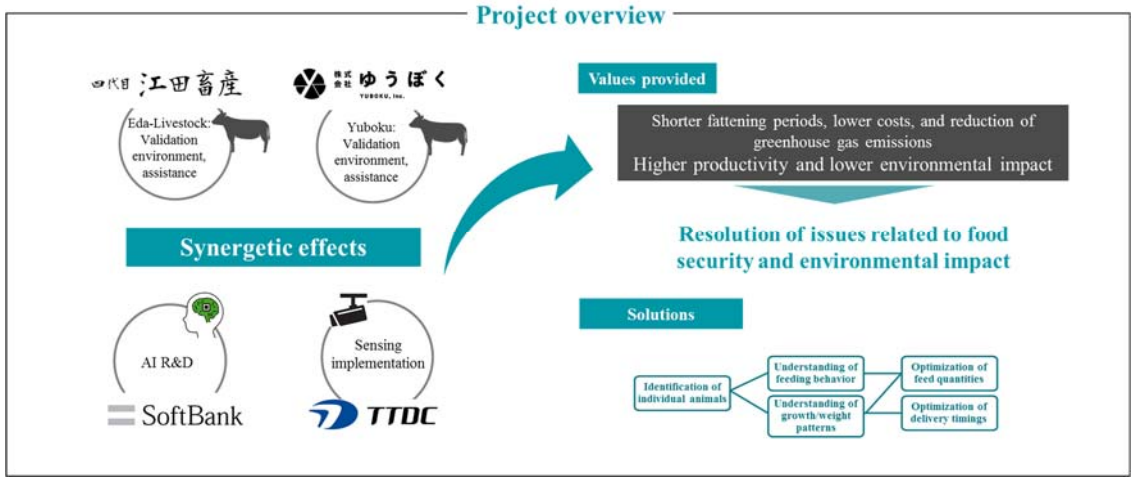
(Through Eda-Livestock Co., Ltd., these technical validations have been adopted by the Foodtech Business Demonstration Project, which is part of a series of research and demonstrations projects being implemented by MAFF to encourage new businesses and resolve issues faced by the food industry.)

- **SoftBank Corporation**

Softbank Corporation is responsible for creating the logic for identifying individual animals and for estimating weight and feed quantities based on image analysis by AI/machine learning using CG training data.

- **TTDC**

TTDC is responsible for building the measurement environment (including the cameras, environment sensors, and cloud connection) and developing livestock raising DX services based on the collection and scraping (extraction and processing) of field data as well as the validation results.



Future prospects

In the future, the aim is to help improve food security and alleviate environmental impacts by realizing AI and sensing technologies capable of collecting and analyzing data related to the growth process of cattle, which has proved difficult to measure and understand by conventional means, and by providing simple and user-friendly solutions for more livestock producers.

■ **Outline of the Try Angle Ehime project to accelerate the implementation of digital technology in Ehime Prefecture (adopted in September 2023)**

Starting in 2022, the Try Angle Ehime project involves the implementation of digital solutions and related technologies by business operators and local authorities within Ehime Prefecture. The aim of the project is to help accelerate the adoption of digital technology as part of measures to address global issues.

Refer to the following website for details (website will open in a separate window).

TRY ANGLE EHIME

■ **Outline of the Foodtech Business Demonstration Project, part of a series of research and demonstrations projects being implemented by MAFF to encourage new businesses and resolve issues faced by the food industry (adopted in October 2023)**

The aim of this project is to support field trials of food technologies and the like to enable the adoption of these technologies across various business phases. In addition, by sharing the results obtained in these trials, this project also wants to encourage new food technology businesses capable of responding to diverse food demand and addressing social issues related to food.

Refer to the following website for details (website will open in a separate window).

SDG-related goals:

*1: FY 2022 food self-sufficiency ratio. Source: MAFF website

Inquiries about these technical validations:

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Overview of Toyota Technical Development Corporation (TTDC)

Established: April 2006
Location: 1-9 Imae, Hanamoto-cho, Toyota, Aichi, 470-0334, Japan
Representative: Yoshiyuki Kagawa, President
Details of business:

IP Business Field

Searches, technical trend analysis, global filing and rights acquisition (patents, designs, and trademarks), translation, and interpretation.

***Keisoku* Business Field**

Development and manufacturing of measurement instrumentation and equipment, proposals for the planning and design of equipment and facilities, presentation and offering of model-based development solutions, calibration, inspection, and repair of measuring instruments, and support for the development of next-generation businesses.

Capital ratio: 100% investment by Toyota Motor Corporation
URL: https://www.toyota-td.jp/