Data company for sustainable
Pork Ecosystem

Eco-Pork

Impact Report

Eco-Pork co., ltd.

2024.9

Eco-Pork

Overview

1. About Eco-Pork
2. Social Challenges in Pig Farming
3. Solutions We Provide
4. Eco-Pork Future Initiatives
5. Impact Story

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About Eco-Pork

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Eco-Pork； Data Company for Sustainable Pork Ecosystem

The World's Only Data-Driven Company Tackling Global Food Issues Through the Digital Transformation of Pig Farming

—Striving for a Future in 2040 Where We Can Still Choose to Eat Meat—

Eco-Pork provides data-driven solutions that enhance productivity in pig farming while reducing environmental impact. We are an impact-driven startup company committed to addressing the global protein crisis and mitigating environmental challenges in livestock industries.

J-Startup Impact

「J-Startup Impact」 selected by
Ministry of Economy, Trade and Industry (METI)

Data Company for

Sustainable
Pork Ecosystem

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Vision

Food is Life:
Passing on the genuine meat Culture to the Next Generation

Humans have lived by taking the lives of various organisms, including animals, plants, and fungi.

Among these, the consumption of land animals has given rise to diverse cultural practices shaped by nations, religions, beliefs, and climates, including taboos and restrictions.

Today, this diversity of meat cultures is facing new challenges such as supply-demand imbalances and environmental issues.

As we strive to solve the sustainability challenges facing both humanity and the planet, can we pass on the rich and meaningful culture of consuming meat — a tradition as old as humanity itself — to future generations?

At Eco-Pork, we believe in creating a world where both the choice to consume meat and the choice not to are equally respected. By leveraging technology, starting with pig farming, we aim to realize a society that offers abundant options and the freedom to choose.

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Mission

Building a Data-Driven Circular Economy for Pork Production

Our mission is to build an ecosystem based on environmental sustainability and respect for food diversity. By leveraging data, we aim to improve every stage of the pork production and distribution process, ensuring the efficient use of limited resources. To achieve this, we will work hand in hand with everyone involved in the pork industry.

EcoSystem V1.0 Food Chain = Individual Optimization

EcoSystem V2.0 Economic Chain = Partial Optimization

EcoSystem V3.0
Global Resource Chain = Holistic Optimization

For People and Planets
well-being and Profitability.

Company Profile

Founded in 2017

With offices in Tokyo and Kagoshima, the company currently has 35 employees

(as of August 2024).

Founder's Background

Takashi Kanbayashi, the founder of Eco-Pork, has been actively involved in addressing food security and environmental issues through his work with NPOs since his student days.

After graduating from university, he worked at a consulting firm where he developed AI-powered solutions.

His desire to "create something meaningful for the next generation" led him to establish Eco-Pork.

Company Name:	**Eco-Pork co., ltd.**
Established:	**November 29 , 2017 (The date is symbolically chosen as "Good Meat Day")**
Locations:	**Tokyo Office: 2F, 3-21-7 Kanda Nishikicho, Chiyoda-ku, Tokyo** **Kagoshima Office:1343 Minamimata, Takarabe-cho, Soo-shi, Kagoshima**
Representative:	**CEO Kanbayashi Takashi**
Business Overview:	**・Development and provision of DX solutions for pig farmers** **・ Pork distribution business** **・ Research related to pig farming**
Financial Institutions:	**MUFG, SMBC, Mizuho Bank, Shizuoka Bank, Shiba Shinkin Bank, Resona Bank, and Japan Finance Corporation**
Patents held:	**20 patents (international patent transfer in progress)**
Flagship Product	**Porker** **"Porker," a pig farming management support system (11% domestic market share)**

Board Members

The board consists of three internal directors, two external directors, and one standing auditor.

Internal directors bring specialized knowledge in finance and business development from backgrounds in consulting firms and banks.

External directors, supported by two leading VC firms, contribute with expertise in deep tech startups and social impact initiatives.

Founder and CEO

Takashi Kanbayashi

Graduated with honors from the Master of Business Administration program at the University of Michigan . Began his career as a consultant at a global consulting firm, specializing in finance and business model development. After that he led the development of new solutions using statistical analysis and AI. Founded Eco-Pork on November 29, 2017 (Good Meat Day), with a vision to utilize technology to tackle environmental and sustainability challenges related to the livestock and meat industries.

Director

Shinsuke Arafuka

Graduated from Keio University with a Master's in Biochemistry. After graduate school, he joined a foreign consulting firm, supporting major manufacturing equipment companies in business improvement and management strategy through data analysis using statistics and machine learning. Co-founded Eco-Pork in response to the protein crisis threatening global food security. To keep pork as a viable food option, he developed "Porker," a technology-driven solution for sustainable pig farming. He became a director of Eco-Pork in April 2021.

Director

Kento Suzuki

Graduated from the Department of Mathematics, Faculty of Science, Tokyo Institute of Technology. He grew up in a family pig farming business in a region of Aichi Prefecture known for pig farming, up until high school. After university, he joined a megabank group, working in large corporate sales and M&A advisory at the group's securities firm. Driven by a desire to address the challenges in pig farming that he had observed since childhood, he joined Eco-Pork and was appointed as a director.

Outside Director

Sou Yanbe

Graduated from the Faculty of Economics at Tohoku University. After working in corporate planning at a semiconductor R&D venture, he joined Realtech Holdings in 2015. He focuses on solving global issues and revitalizing the local economy by investing in and supporting promising realtech ventures. He has served as an auditor for Eco-Pork since April 2021 and as an outside director.

Outside Director

Hiroaki Ido

Graduated from the Faculty of Commerce at Chuo University. After working in corporate lending and sales at Nishi-Nippon City Bank, he joined QB Capital in 2021, focusing on investments in real tech ventures, including university-affiliated ones. In April 2024, he joined NCB Venture Capital as a Co-GP of QB Fund No. 2. Following QB Capital's lead investment in Eco-Pork in June 2023, he was appointed as an outside director.

Full-time Audit & Supervisory Board Member

Naofumi Aoyama

Graduated from the Faculty of Commerce at Keio University. After joining Mitsui & Co., Ltd., he worked primarily in the CFO department, with experience in both domestic and overseas offices, including Sydney, Perth, and Brussels. Having had a lifelong interest in "food," one of the three necessities of life, he decided to join Eco-Pork. He was appointed as a full-time auditor in August.

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Certifications and Awards

Major Investors

< Certifications >

Through demonstration projects led by the Ministry of Agriculture, Forestry and Fisheries and the Ministry of Economy, Trade and Industry, we have objectively verified the effectiveness of our DX solutions using data. At the same time, we are developing new technologies for the future.

< Major investors >

We have received investments from a wide range of organizations, including impact investors. Corporate venture capital (CVC) is also involved to support our long-term vision and synergies.

Key Certifications and Awards

J-Startup Impact

2023: Selected for the Ministry of Agriculture, Forestry and Fisheries' Innovation Promotion Project for SMEs (Phase 3 funding)
2023: Selected for METI's J-Startup Impact Program
2022: Selected for METI's Growth Research and Development Support Program for SMEs
2022: Selected for the Ministry of Agriculture, Forestry and Fisheries' Comprehensive Support Program for Startups
2021: Selected for METI's Global Startup Ecosystem Strengthening Program
2020-2021: Selected for the Ministry of Agriculture, Forestry and Fisheries' Smart Agriculture Demonstration Project

ICC KYOTO 2022 Catapult Grand Prix Finalist
Real Tech Venture of the Year 2020
ICC KYOTO 2019 Startup Catapult Finalist
TechCrunch Tokyo 2018 Runner-Up

Major Investors

UntroD
QB Capital
みらい創造機構 MIRAI SOUZOU
食の未来ファンド kemuri ventures
Leave a Nest CAPITAL
森久保薬品株式会社
Bell System24
future food fund
OKB グループ 株式会社OKBキャピタル
ENEOS
綿半
OKASAN CAPITAL PARTNERS

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Business Structure

Eco-Pork contributes to addressing key issues faced by both consumers and society, such as mitigating the global protein crisis and reducing environmental impact, by providing solutions that enhance productivity and lower environmental burdens for pig farmers. These solutions improve the sustainability of pig farming operations.

Starting in 2024, Eco-Pork, in collaboration with ENEOS, will launch a project that positions pig farmers as J-Credit creators. This initiative aims to further enhance the social value and sustainability of pig farming.

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Social Challenges in Pig Farming

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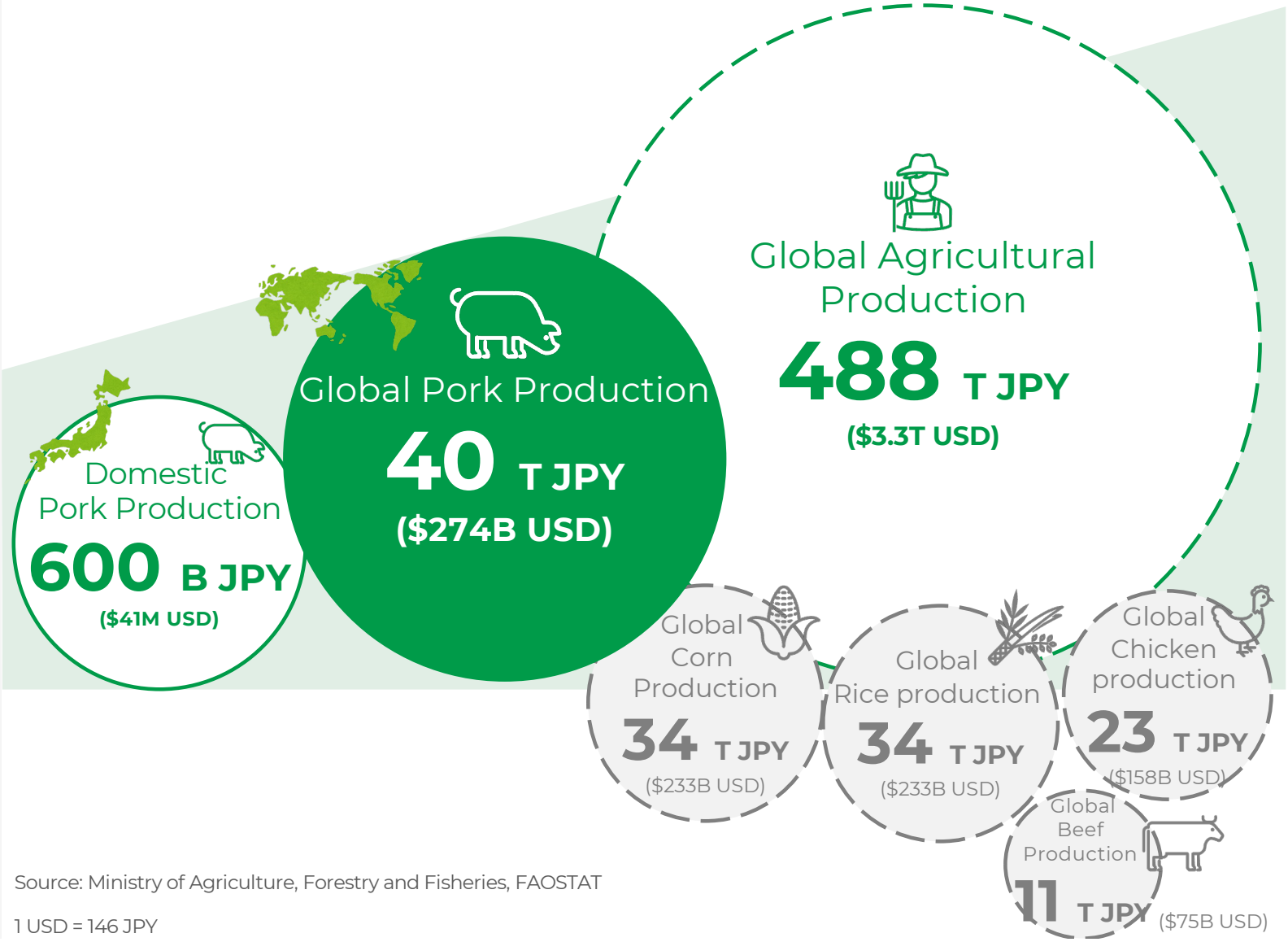
Pig Farming: The World's Largest Primary Industry Worth 40 Trillion Yen

In Japan, the pig farming industry generates approximately 600 billion yen, while globally, it is a massive 40 trillion yen industry.

The total value of global agricultural production was about 488 trillion yen in 2021, and among various sectors, pig farming surpasses other crops such as corn and rice, as well as other livestock products like beef and poultry, making it the largest industry.

From this, it can be concluded that pig farming holds the largest market size among all primary industries worldwide.



Source: Ministry of Agriculture, Forestry and Fisheries, FAOSTAT

1 USD = 146 JPY

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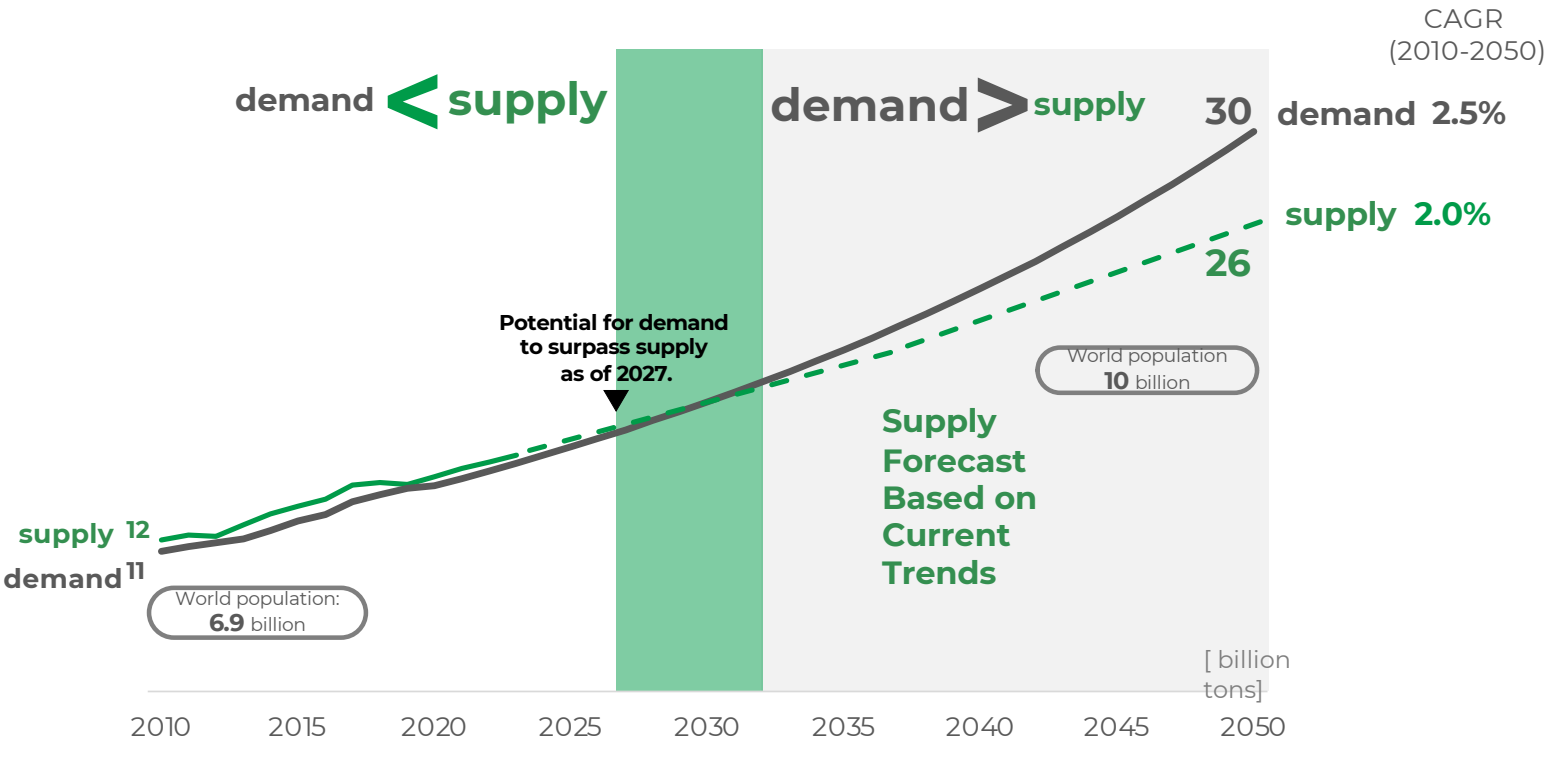
Social Issue 1: The Protein Crisis Projected for 2027–2032

The current global population is around 8 billion, and it is expected to reach approximately 10 billion by 2050.

As economies grow wealthier, people tend to shift from carbohydrate-based diets to those rich in animal products such as meat and fish, leading to an increase in protein consumption.

The term "protein crisis" refers to the imbalance between protein supply and demand in the future due to this growing population. This crisis is expected to become a significant social issue as early as 2027–2032.

Global Demand and Supply of Protein-Rich Agricultural Products



The global population grew from 6.9 billion in 2010 and is projected to reach **10 billion** by 2050.

By 2027, demand could exceed supply.

By 2050, demand for protein-rich agricultural products will be **2.7 times higher** than in 2010.

Source: Based on the 2022 FAO/OECD report, FAOSTAT (Production, Food Balances), and UN "World Population Prospects 2019," with estimates by our company.
Agricultural products included in the estimate: Plant-based proteins (soybeans) and animal-based proteins (meat, fish, eggs, dairy).
For the supply side, projections are calculated based on current growth rates, without factoring in potential technological innovations in production systems.

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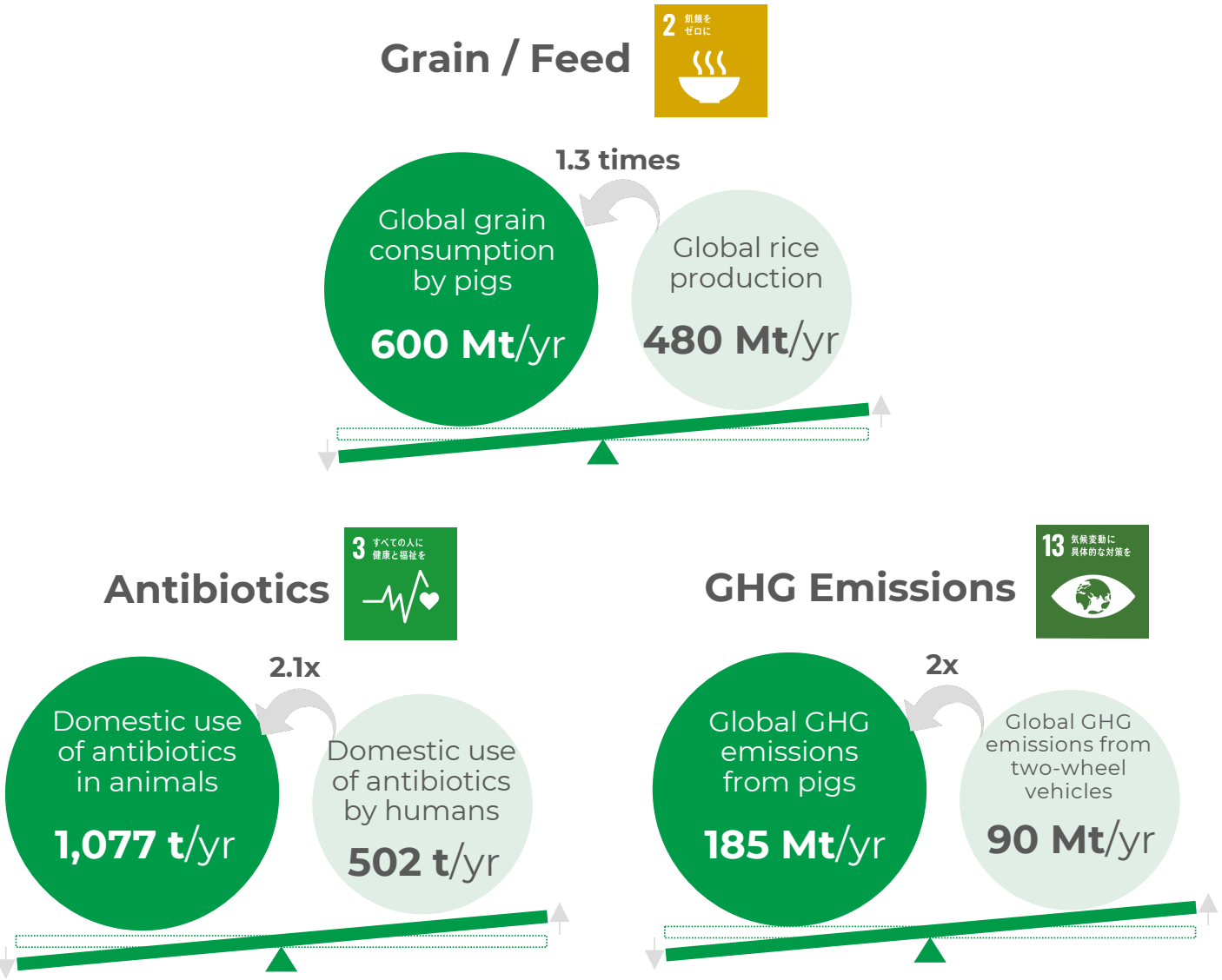
Social Issue 2: The Environmental Impact of Pig Farming

Globally, the consumption of 600 million tons of grain per year, the emission of 185 million tons of greenhouse gases (GHG), and the use of antibiotics at 2.1 times the rate of human use (based on domestic data) are contributing to issues such as grain shortages and the rise of antibiotic-resistant bacteria.

These factors are seen as threats to the United Nations' Sustainable Development Goals (SDGs), including "Goal 2: Zero Hunger," "Goal 3: Good Health and Well-Being," and "Goal 13: Climate Action."



Source: FAOSTAT , AMR One Health Trends Survey

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Social Issue 2: The Environmental Impact of Livestock (Future Outlook)

To avoid the crisis, increased livestock production will be necessary, but it is crucial to consider the environmental impact.

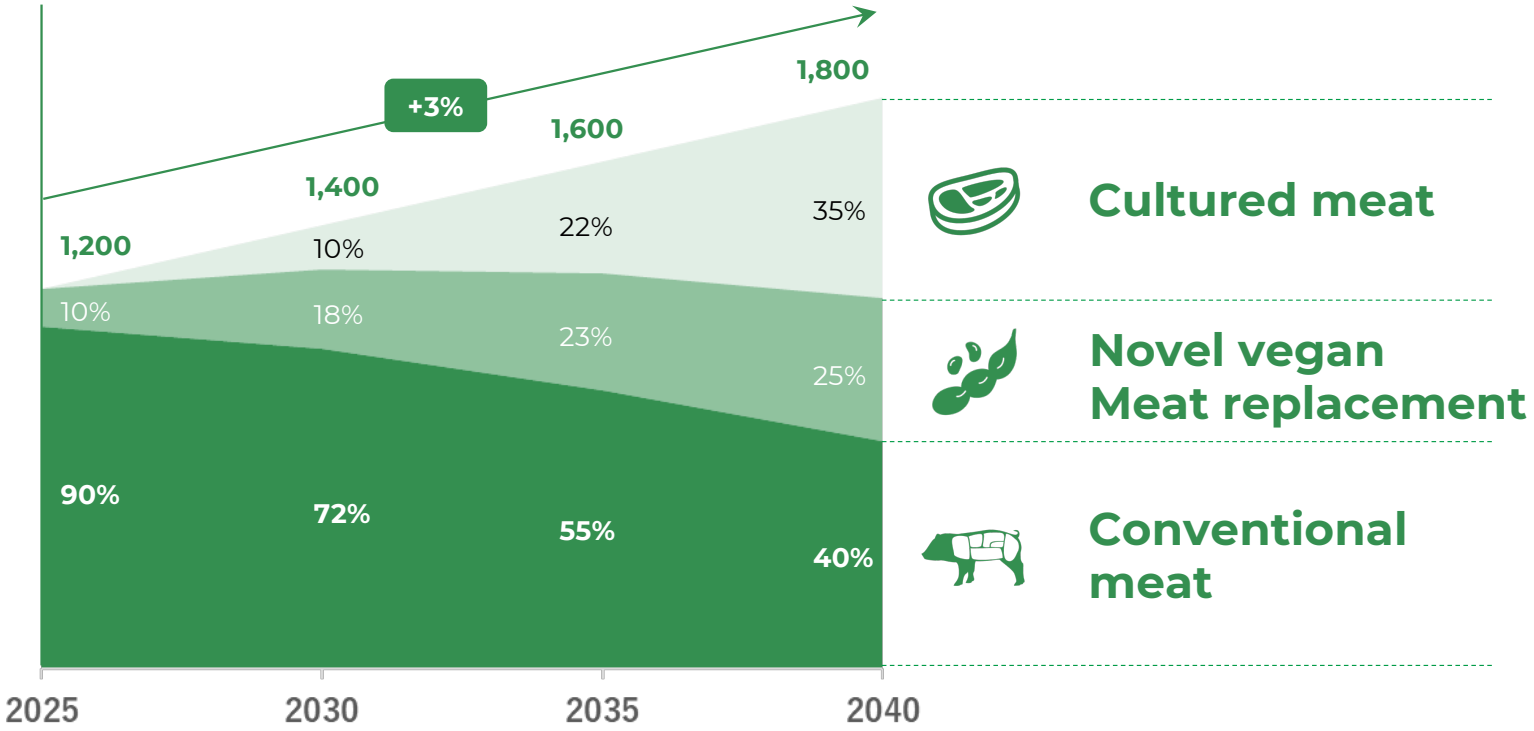
Looking at the global meat market, research and development of environmentally friendly alternatives such as plant-based and cell-cultured meats are advancing, and the market size for these alternatives is expected to grow.

If the environmental impact of livestock remains high, these alternatives are likely to replace traditional meat production.

Improving the resource efficiency of livestock farming is essential to preserving the culture of pork consumption for future generations.

By 2040, the share of livestock-based meat (traditional animal-derived meat) is expected to decrease to 40%

Global Meat Market Outlook (in $ bn, global)



Source: AT Kearny " How will cultured meat and meat alternatives disrupt the agriculture and food industry" 2019

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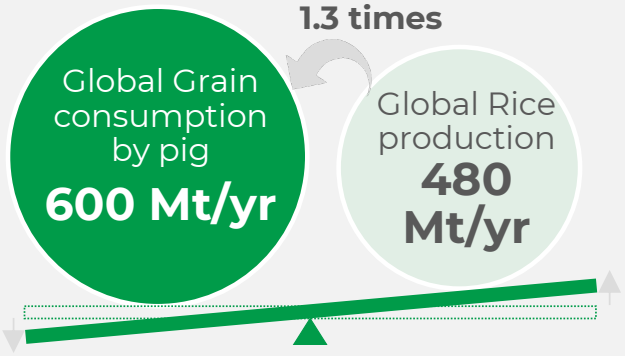
Social Issue 2-1: Environmental Impact of Feed and Increasing Food Demand

It is said that one pig consumes about 300kg of feed before it is shipped, and globally, pigs consume approximately 600 million tons of feed annually, exceeding the global production of rice.

At the same time, the world's population is rapidly expanding and is expected to reach about 10 billion by 2050, which suggests that food demand will continue to increase.

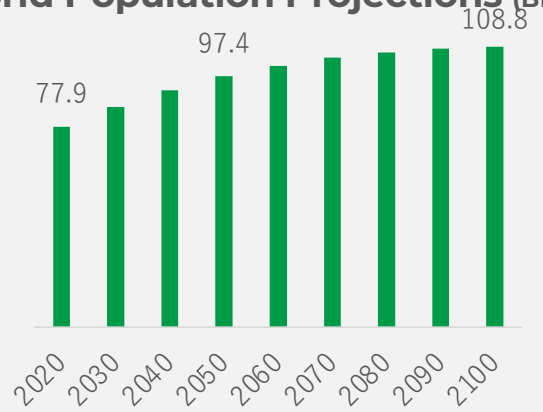
This could potentially lead to competition for food between humans and livestock.

Pig grain consumption exceeds global rice production.



The world's population is expected to approach 10 billion by 2050, leading to an increase in food demand.

World Population Projections (Billions)



The issue of grain competition between humans and pigs leading to a food crisis.

Source: FAOSTAT , United Nations "World Population Prospects 2019 "

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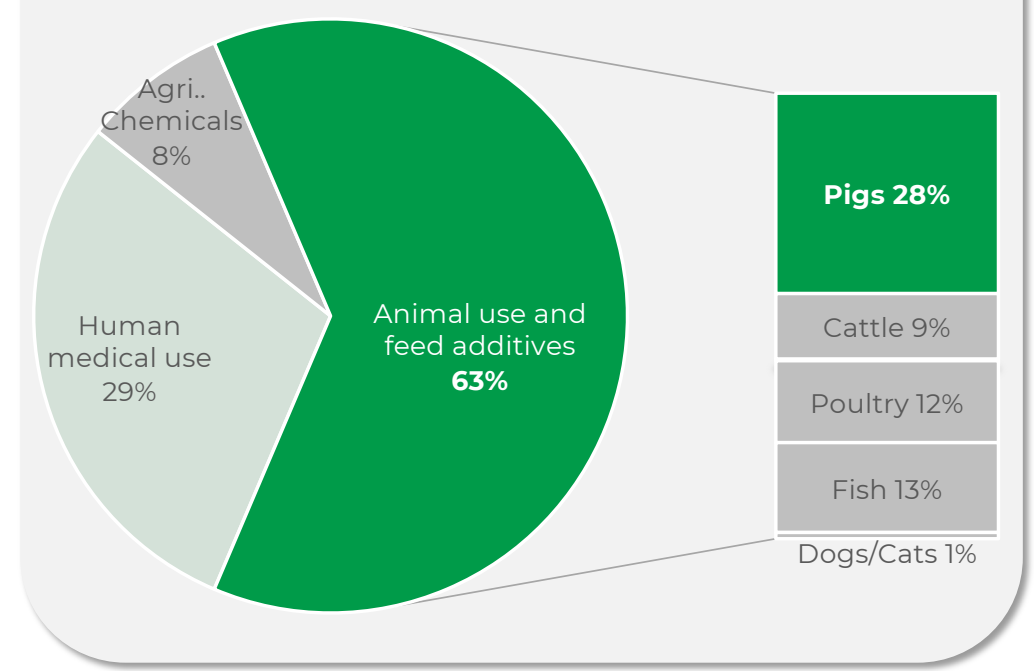
Issue 2-2: Antibiotics and Antimicrobial Resistance

As antimicrobial-resistant bacteria increase, infections that could previously be treated effectively may become more severe, potentially leading to higher mortality rates.

If measures such as reducing the use of antibiotics are not implemented, it's estimated that by 2050, approximately 10 million people could die from these infections, surpassing the current annual death toll of 8.2 million from cancer.

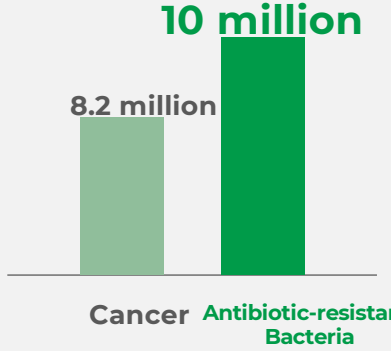
Japan has one of the highest detection rates of antimicrobial-resistant bacteria globally, with approximately 63% of antibiotics used for animals, which is about 2.1 times the amount used for humans. Among animals, the pork industry uses the most antibiotics, making reduction efforts a critical and urgent issue.

Antibiotic usage in Japan (2020)

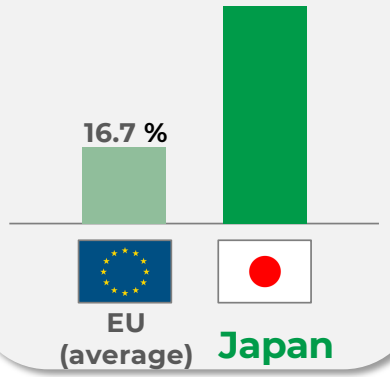


Source: AMR One Health Trend Survey, Ministry of Health, Labor and Welfare, WHO
* AMR: Antimicrobial Resistance .

Estimated number of deaths caused by AMR* (2050)



"International Comparison of Antibiotic Resistance Rates (2020)(Methicillin-resistant Staphylococcus aureus)"



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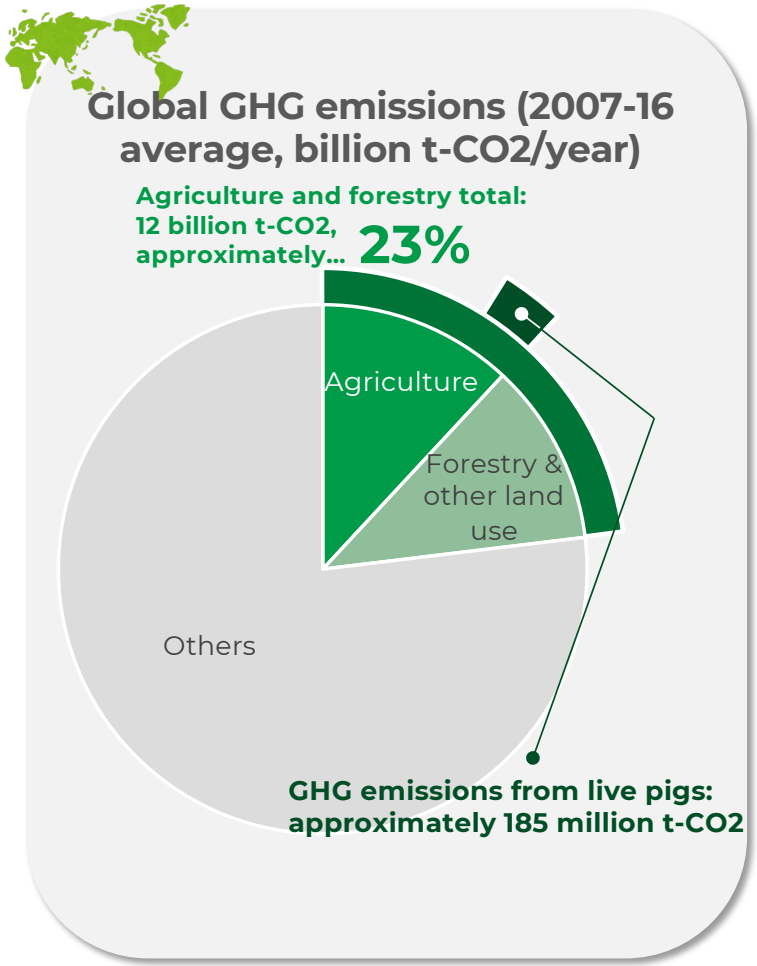
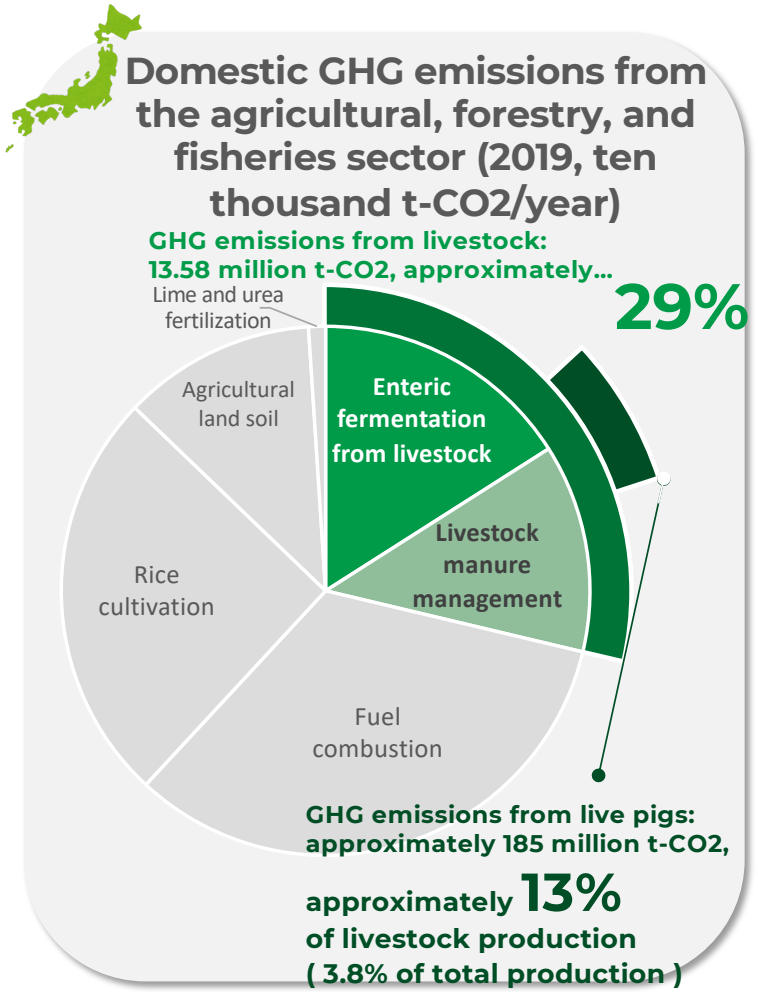
Social Issue 2-3: GHG Emissions from Pig Farming (Emissions from Livestock)

The global GHG emissions are estimated to be approximately 52 billion tons CO2-equivalent (average between 2007-2016), with the agricultural and forestry sectors accounting for about 12 billion tons, representing roughly one-quarter of the total. Of this, emissions from pig farming alone are estimated to contribute around 185 million tons of CO2.

In Japan, the GHG emissions from the agricultural, forestry, and fisheries sectors amounted to about 47.47 million tons in 2019, with 13.58 million tons of CO2 emissions coming from livestock, which represents about 29% of the total.

Furthermore, CO2 emissions from pig farming alone accounted for 1.74 million tons, representing 13% of total livestock emissions.





Source: IPCC , FAOSTAT , Office of the Greenhouse Gas Inventory

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Environmental Impact of GHG Emissions

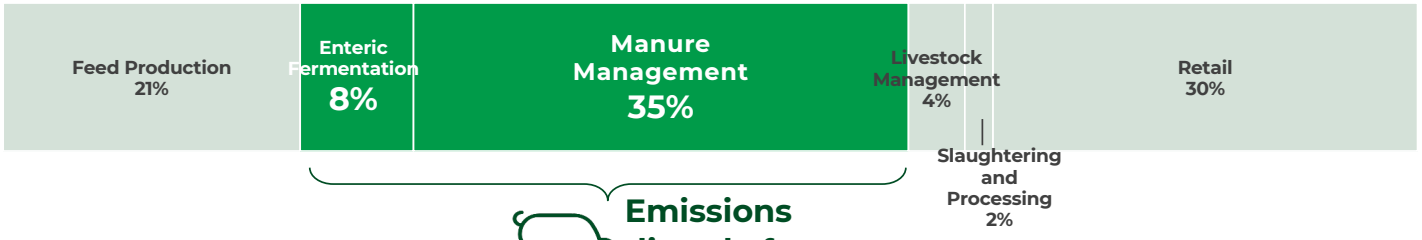
The GHG emissions (in CO2 equivalents) from pig farming shown on the previous page — 185 million tons globally and 1.74 million tons domestically — are emissions directly related to the pigs themselves.

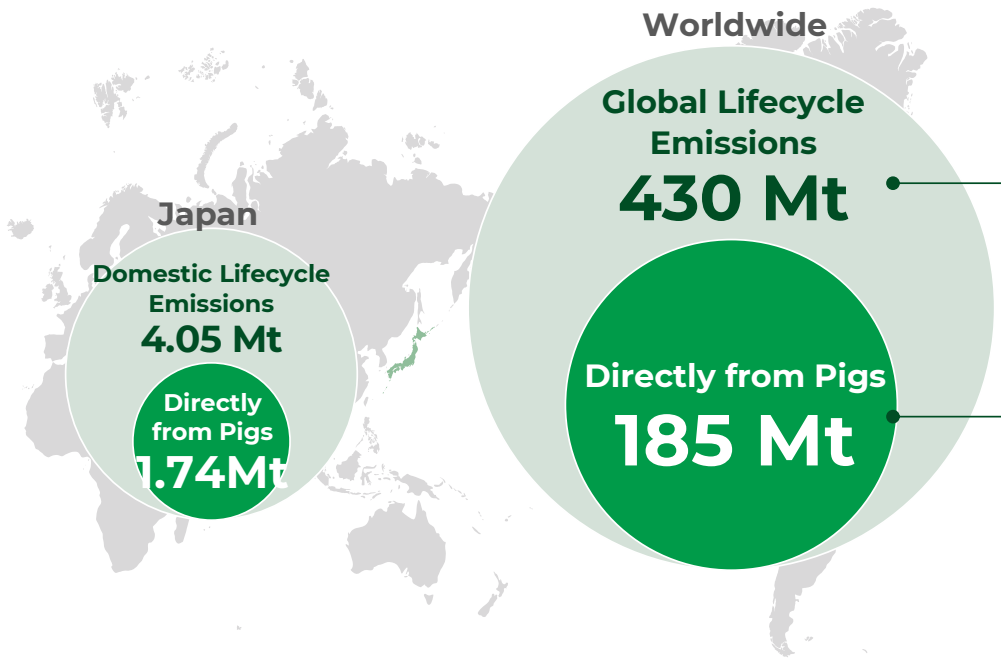
In addition to this, when we consider the entire lifecycle of pig farming, including feed production, energy use in the production process (electricity, LPG, etc.), livestock management, slaughtering, processing, and retail, the total emissions are estimated to reach approximately 430 million tons globally and 4.05 million tons domestically.

These figures are several times higher than the global GHG emissions from motorcycles, suggesting that global regulations and rules for the livestock and pig farming industries may be established in the future.

CO2 Composition Across the Entire Pig Farming Lifecycle (Estimates)

(Based on the Scope Defined by the Ministry of Agriculture, Forestry, and Fisheries)





Global GHG emissions from motocycles

90 million tCO2/ year

4.8 more emissions than motocycles

2.0 more emissions than motorcycles

Source: Hishinuma (2015) " Estimation of greenhouse gas emissions associated with pork production systems using LCA methodology" Composition ratio Based on the above, estimates were made from GHG emissions

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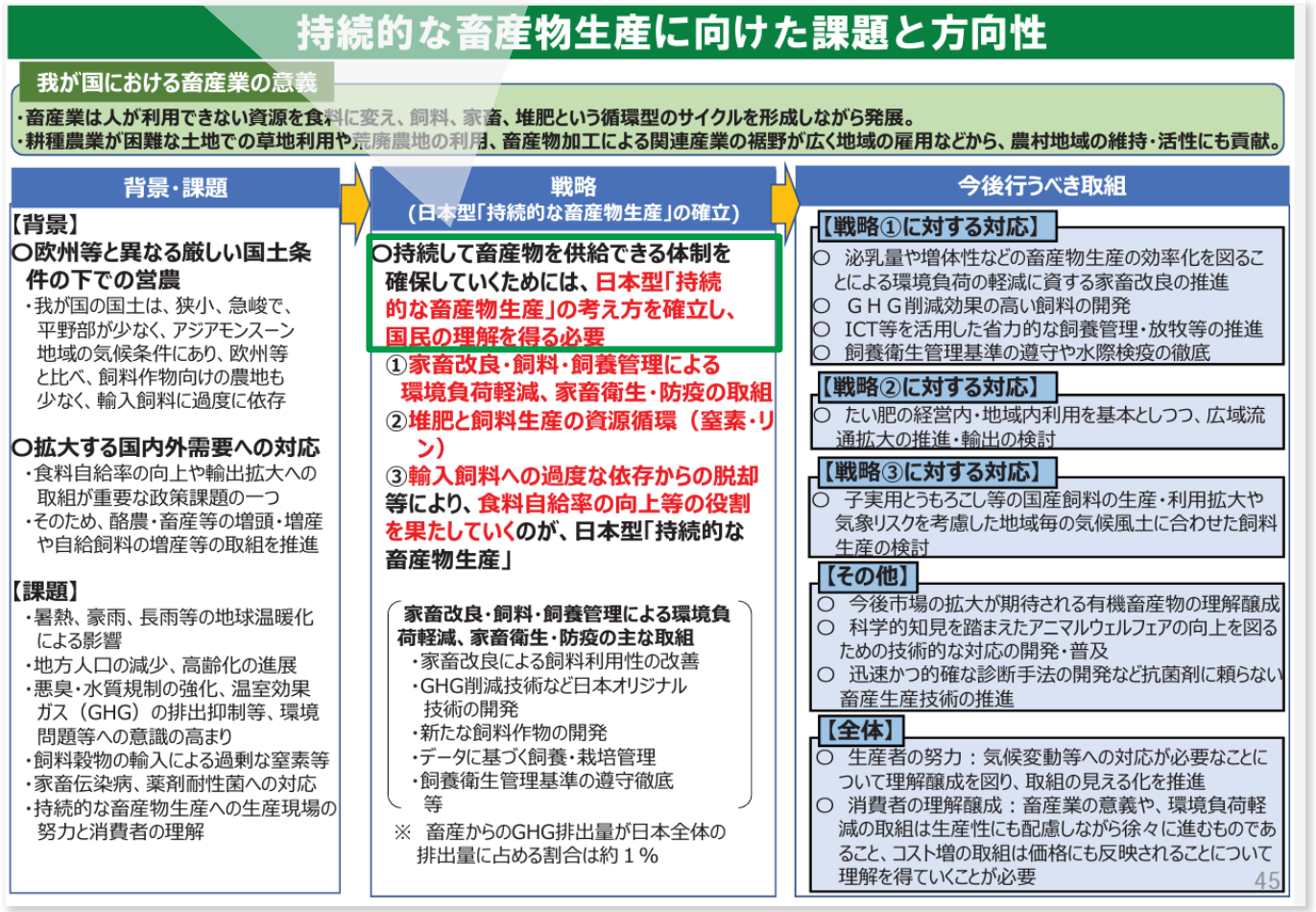
[Reference] MAFF (Ministry of Agriculture, Forestry and Fisheries) “Green Food System Strategy"

Due to limited farmland for feed crops and specific climate conditions, Japan is currently overly reliant on imported feed. As domestic and international demand continues to grow, it is necessary to establish a sustainable livestock production system, including resource circulation in livestock management, composting, and feed production.

This was outlined in a document by the Ministry of Agriculture, Forestry and Fisheries on May 12, 2021.

In order to ensure a sustainable supply of livestock products in Japan, it is necessary to **establish a uniquely Japanese concept of "sustainable livestock production" and gain public understanding**.
(Ministry of Agriculture, Forestry and Fisheries, May 12, 2021)



Source：MAFF Website (www.maff.go.jp/j/kanbo/kankyo/seisaku/midori/attach/pdf/index-10.pdf)

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3

Solutions We Provide

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Product & Service Lineup

"Porker", the pig farming management support system, is a cloud service that visualizes all aspects of pig farming.

Through the use of various IoT sensors and pigsty environment controllers, it automates the pig farming process.

By contributing to increased sales, cost reductions, and labor savings, the system helps improve the sustainability of pig farmers.

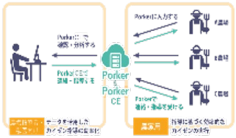
2018 **Porker**

ICT

Pig farming management support system

Porker CE

For farm leaders and veterinarians (Consultant Edition)



Porker Connect

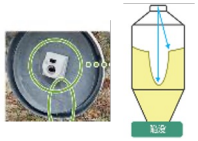
Wi-Fi installation service in pig farms

2020 **Porker Sensor**

IoT

Temperature and humidity sensor

Milfee:
Feed Tank Level Management Sensor



i-Series

IoT for checking the health of individual pigs

Sperm and semen analyzer / Ultrasound imaging diagnostic device
Ultrasonic back fat thickness measuring device

Various surveillance cameras

Other IoT sensors

- Power Abnormality/Leakage
- High Temperature Equipment Warning
- Air Pressure
- External Temperature and Humidity
- Water Leakage
- CO2/NH3
- Mesh Weather Forecast
- Water Gauge

2021 **Porker AI**

AI

IoT

AI Pig Camera

Free stall *ABC*

Identifying individual sows and estrus
*under development

2022 **Porker Controller**

IoT

Auto mation

Pig Farm Environment Controller

+

Various fans

+

Cooling Pad

Evaporative Spray Cooling System

Curtain Roll-Up Winch

Fan heater

+

Water Pump

Feeder

High temperature alarm

etc.

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Eco-Pork's Solution: Automation in Pig Farming

By combining the Porker, pig farming management support system, with various IoT sensors and pigsty environment controllers, Eco-Pork aims to automate pig farming. Traditionally, improvements in productivity and production volume have been achieved through the expertise of specialized trainers.

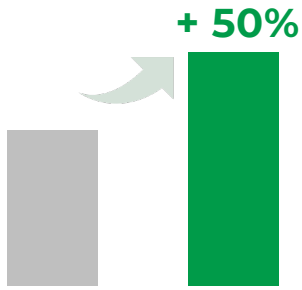
With the automation of pig farming, we can increase pork production while simultaneously improving productivity. This also leads to a reduction in feed consumption, GHG emissions, and the use of medication, contributing to the reduction of environmental impact.

Automation of Pig Farming
Using Data from ICT/IoT/AI and Pig Farming Equipment

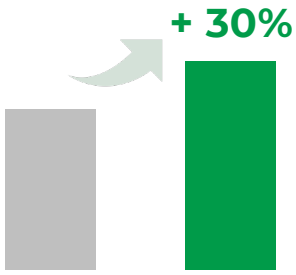
Monitoring and Control of:

- ✓ **Pig Status**
- ✓ **Feed**
- ✓ **Water**
- ✓ **Breeding Environment**

Expected Benefits of Pig Farming
Automation & environmental impact

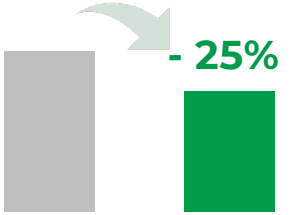


①Pork Production Vol.



②Feed efficiency

③Medication Use



④GHG emissions

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[Reference] Our Products' Alignment to Animal Welfare

FAIRR, a global livestock initiative, emphasizes the need to address animal welfare, citing risks such as the global spread of infectious diseases and a decline in growth and reproductive abilities due to improper livestock management.

Our products comply with the basic policies outlined in animal welfare guidelines. By offering the Porker system, we help farmers implement and track specific activities related to animal welfare, supporting their efforts to achieve better practices.

FAIRR's Evaluation Criteria for Animal Welfare and Eco-Pork's Product Alignment

- FAIRR considers animal welfare to be a significant risk factor and evaluates policies and performance related to it.
- Eco-Pork provides product solutions that align with each of the evaluation criteria.

FAIRR Evaluation Criteria		Specific details	Corresponding Eco-Pork products and initiatives
Policy (Recognition and Reflection of the Five Freedoms)	Hunger, Malnutrition, and Thirst	• Provide animals with continuous access to fresh water and a diet that maintains health and vigor.	• **AI Pig Camera (ABC):** Utilizes weight verification and appropriate feeding
	Heat Stress or Physical Discomfort	• Ensure proper shelter and a comfortable resting area. • Maintain appropriate ventilation, temperature, and humidity.	• Temperature and Humidity Sensors (Porker IoT): **Controls the pigsty environment.**
	Pain, Injury, and Disease	• Disease prevention/health management • Appropriate diagnosis and treatment	• **Porker IoT:** Monitors health conditions and reduces the accident rate.
	Express Normal and Natural Behavior	• Provide sufficient space, proper facilities, and the company of the animal's own kind to allow for natural behavior.	• **Development of individual identification and disease detection technologies to enable free-stall breeding.**
	Fear and Distress	• Identifying signs of stress, etc. • Appropriate response	• **Porker IoT** : Monitors health conditions and reduces the accident rate
performance		• Specific actions and activities related to welfare improvement.	• **Data accumulated on Porker** makes it possible to quantify
certification		• Animal welfare certification based on performance.	• Providing "**Eco-Pork Certification"** considering animal welfare.

Eco-Pork's unique certification is given

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[Reference] Example Solution: ABC

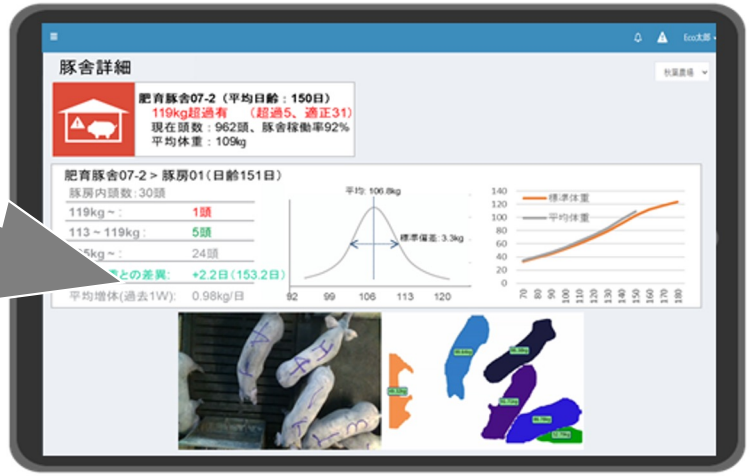
ABC (AI Buta / Bio-sensing Camera)

A robot installed on the ceiling of the pigsty autonomously moves to collect data on pig weight, health conditions, and other growth-related information.

The data is immediately reflected in the Porker system, enabling detailed weight management and shipment planning. This contributes to increased sales, reduced feed costs through efficient feeding, and labor-saving improvements.

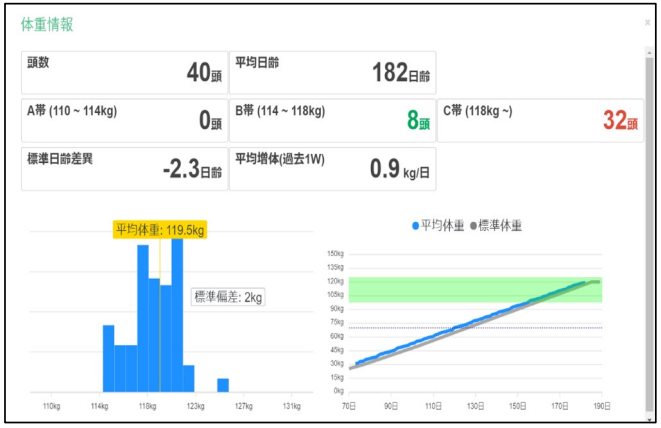
Robot-Driven AI Pig Camera

Porker screen image



Grading Rate (National Average)	Expected Improvement with ABC
High: 51.5%	High: 65.8%
Medium: 37.3%	Medium: 23.5%
Standard: 11.0%	Standard: 10.5%

Grading Rate Improvement Simulation for Dressed Pig Carcasses



Porker Weight Management Screen

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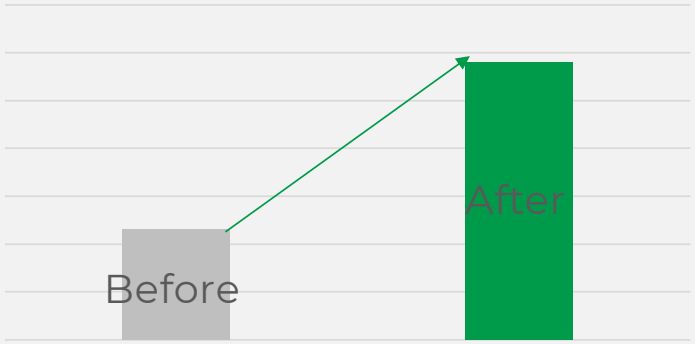
[Reference] Results from Demonstration Experiments

In the 2020 Smart Agriculture Demonstration Project by the Ministry of Agriculture, Forestry and Fisheries (MAFF), a sales improvement of approximately 14% was demonstrated.

In the 2021 Chiba Prefecture Project, a sales improvement of approximately 8.7% was confirmed.

FY2020 MAFF Smart Agriculture Demonstration Project

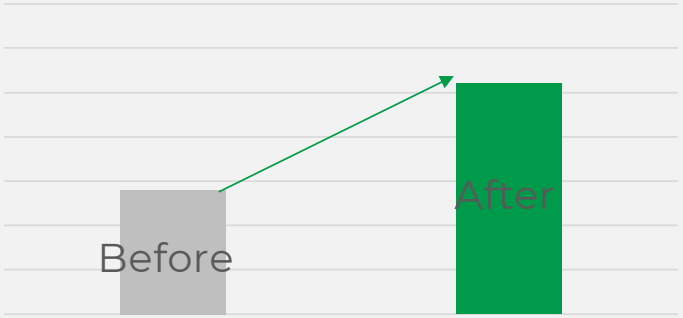
A pig farmer (600 sows) reported **an increase in sales of 79.8 million yen** by using Porker.



14% improvement

FY2021 Chiba Prefectural Government Project

Another Porker user (230 sows) reported **the system improved sales by approximately 1.5 million yen per year.**



8.7% improvement

* Chiba Prefecture survey

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[Reference] Patent for Increasing Pork Production

We have obtained 20 patents related to livestock, including automatic management systems, weight estimation, and disease management.

*11 of these have been granted international patents.

Granted Patents (Partial List)

Category ICT	IoT	AI		Summary of Invention	Patent Number/Application Number (Registration date/ Filing date)
✓	✓		**Automated Livestock Production Management System**	Control system for feeding equipment to enable automatic management of livestock production (livestock factory)	PatentNo.6704164 (Date of registration:May 14 , 2020)
✓		✓	Market supply and **Price estimation**	A model for estimating the status of meat trade that provides information for considering stability and economic rationality in future procurement	PatentNo.6716811 (Date of registration:June 15 , 2020)
✓		✓	Collateral for Movable Property	System for monitoring and predicting the sales price of livestock movable collateral	PatentNo.6727597 (Date of registration: July 3, 2020)
✓		✓	**Group Weight Control Shipment Forecasting System**	A system that predicts weight/shipping time by age using information on the weight distribution of livestock raised in groups during the rearing period.	PatentNo.6736107 (Date of registration:July 17 , 2020)
✓	✓		Automated Livestock Production Management System (Improved)	Improved control system for feeding equipment to enable automatic management of livestock production (livestock factory)	PatentNo.6778453 (Filing date: October 14, 2020)
✓	✓	✓	Herd Livestock **Image Weight Estimation**	Automatic weight estimation and feeding management system using image data for livestock herd management	PatentNo.6781440 (Date of registration: October 20. 2020)
✓			Work Event Management System	Livestock herd management methods, systems for implementing livestock production status control	PatentNo.6796879 (Date of registration:November 19 , 2020)
✓		✓	On-farm disease risk measurement system	Service to measure biosecurity risk on farms and provide countermeasure policies	PatentNo.6828926 (Filing date: January 25, 2021)
✓	✓	✓	**Swine Disease Management**	A system for efficiently detecting livestock diseases and estimating the risk of disease incidence using IT in order to enable large-scale animal husbandry with a small number of animals.	PatentNo.6828928 (Filing date: January 25, 2021)
✓			Livestock Group Management Livestock Performance **Management and Forecasting System** for each Production Group	Group management function + Production management, performance measurement, and performance forecasting system on a group basis	PatentNo.6847478 (Date of registration: March 5, 2021)
✓			Breeding Livestock Evaluation	A system for analyzing the performance factors of breeding livestock using information on calving and suckling and subsequent growth of breeding livestock.	PatentNo.6868293 (Date of registration: April 14 , 2021)
✓			Livestock Status Control System to Prevent Work Omissions and Improve Performance	A system to monitor the feeding conditions and breeding events (status) of all sows for the purpose of improving the feeding of sows through precise management of sows as a group.	PatentNo.6882802 (Date of registration: March 5, 2021)
✓	✓	✓	**Breeding Livestock Productivity Management System**	Predictive models that estimate the reproductive productivity of breeding livestock using environmental information brought by IoT sensors, and systems for managing the feeding environment.	PatentNo.6902815 (Date of registration: June 24, 2021)

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Eco-Pork Future Initiatives

Eco-Pork

Targets to achieve by 2027

Impact indicators	Targets for 2027 (compared to 2017)
Increase pork production by	50%
Improve feed efficiency by	30%
Reduce GHG emissions by	25%
Reduce Antimicrobial use by	80%

To pass down meat culture to the next generation, we set the necessary target values and aims to achieve these goals by 2027 with the involvement of relevant stakeholders.

Eco-Pork

Improving feed efficiency

Globally, pigs consume 600 million tons of grain, which is 1.3 times the amount of global rice production. Improving feed efficiency is a crucial challenge for the sustainability of livestock farming.

In the domestic pig farming industry, approximately 60% of costs are attributed to feed. Enhancing feed efficiency can lead to significant cost reductions.

By optimizing feeding practices and advancing management systems with AI Buta(pig) Cameras and Porker, feed efficiency can be improved by 25%.

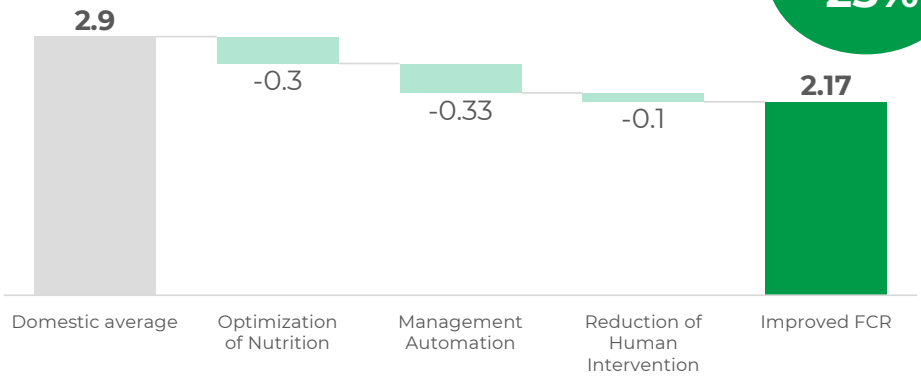
Initiatives:
Sophisticated and automated management system with DX piggery including AI Buta(pig) Camera/Porker

Porker

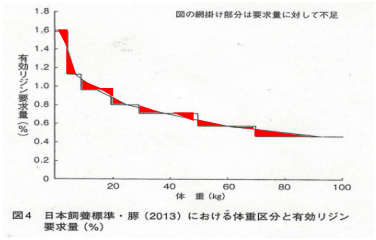
FCR Improvement: 2.9 → 2.2*

Improved by **25%**

By optimizing nutrient excess and deficiencies in feed, enhancing management system automation, and reducing human intervention in daily management, we improve feed efficiency.



Optimizing nutrient excess and deficiencies under traditional feeding improves FCR by 0.3.



Achieving a similar management system to top farms improves FCR by 0.33.

The average farm period is shortened by 21.4 days, from 187.0 days to 165.6 days, by implementing detailed management akin to top farms.

Average farm 187.0 days

Top farm 165.6 days

Shortened by 21.4 days

Reducing accidents through the minimization of human intervention in daily management improves FCR by 0.1.

Preventing disease entry by reducing human contact lowers accident rates from 6.46% to 3.02%.

*FCR (Feed Conversion Ratio): The amount of feed required to gain 1 kg of body weight. The domestic average is 2.9 kg.

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Reducing antimicrobial use

The use of antimicrobials in livestock farming in Japan is 1.8 times that of human pharmaceuticals, amounting to 1,021 tons per year. In pig farming, reducing disease prevalence and antimicrobial use not only improves resource efficiency but also leads to cost and labor reductions.

Digitizing pig barns enables the automation of barn operations and the reduction of human involvement in daily management, which decreases the rate of accidents. Consequently, this contributes to a reduction in antimicrobial use.

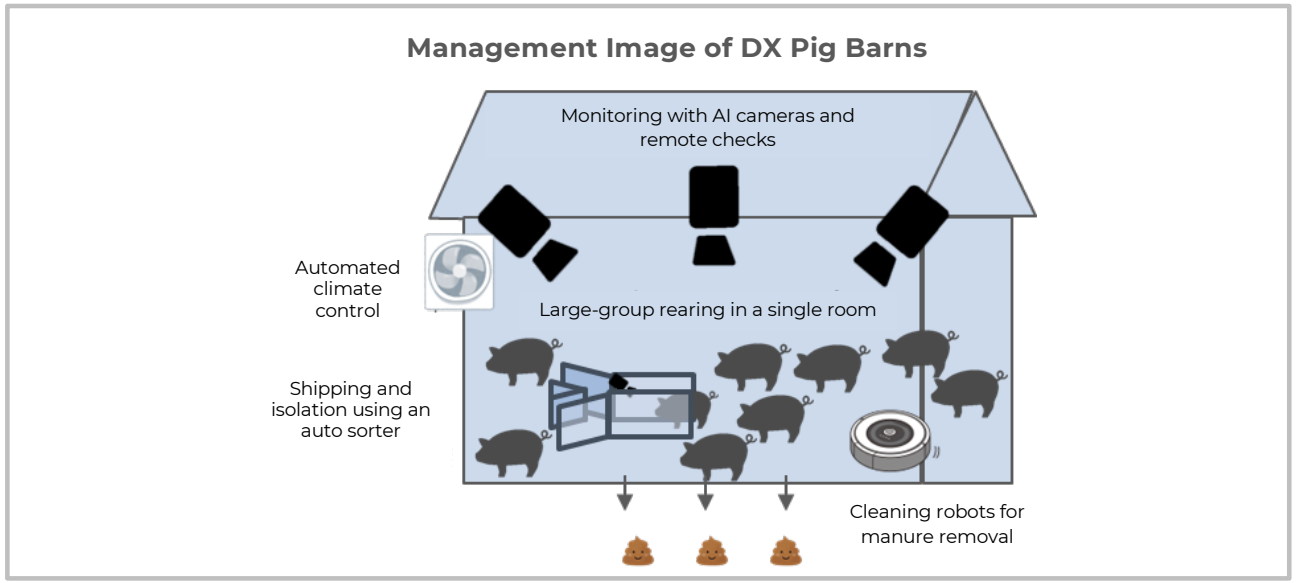
Initiatives:
Automation of barn operations with DX pig barns
Unmanned daily management

Porker

80% reduction in antimicrobial use

Reduced by **80%**

With our DX pig barns, barn operations can be automated. By eliminating human involvement in daily management, we prevent the introduction of pathogens by people and reduce the post-weaning accident rate (accident rate from 6.46% to 3.02%).
→ This leads to a reduction in the use of antimicrobials.



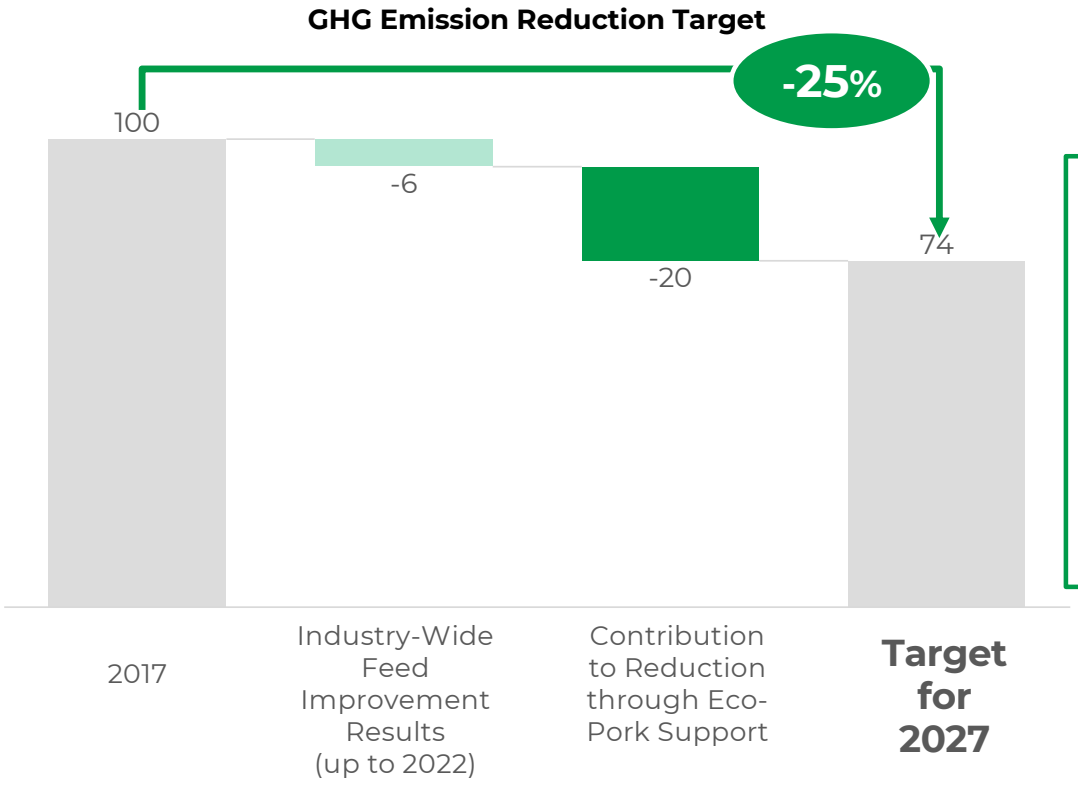
Reducing GHG emissions

As mentioned in Chapter 2, GHG emissions from pig manure management are significant. However, it has been demonstrated that using low crude protein (CP) feed can reduce GHG emissions from manure. This methodology is registered as "AG-001" under the J-Credit scheme.

We aim to contribute to a 25% reduction in GHG emissions by 2027, compared to 2017 levels. While the entire industry is gradually reducing the CP rate of conventional feed, Eco-Pork is further committed to supporting farmers in promoting the use of J-Credits and the introduction of low CP feed to achieve additional reductions.

Contributing to a 25% Reduction in GHG Emissions

Reduced by 25%



J-クレジット
当該事業は、J－クレジット制度に登録されたプロジェクトとして、地球温暖化対策に貢献しています。

Eco-Pork Supports

- Promoting the introduction of low crude protein (CP) feed to pig farmers
- Various support for registering as J-Credit
  - ✓ Collecting evidence using Porker
  - ✓ Application agency services
  - ✓ Sale of credits

Source: Company analysis and estimates based on Eco-Pork customer case studies.

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【Reference】 Methodology of J-Credit AG-001

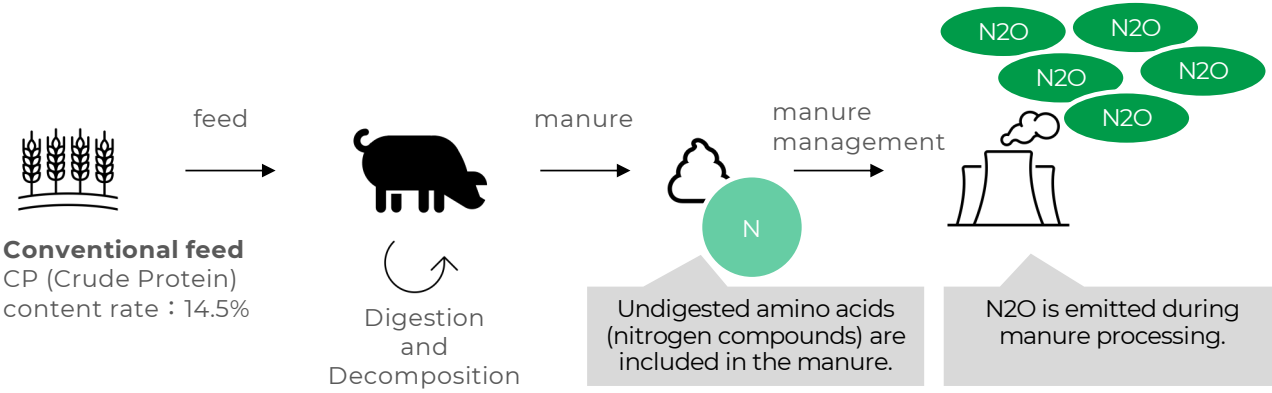
J-Credit is a system recognized by the government that certifies the reduction or absorption of CO2 and other emissions as credits. In the pig farming industry, a method applicable under this system is registered as AG-001.

By replacing conventional feed with amino acid balanced feed that has a lower CP (crude protein) content, the amount of amino acids (nitrogen compounds) that cannot be digested in the body and are included in manure is reduced. This helps suppress N2O (nitrous oxide) emissions during manure processing.

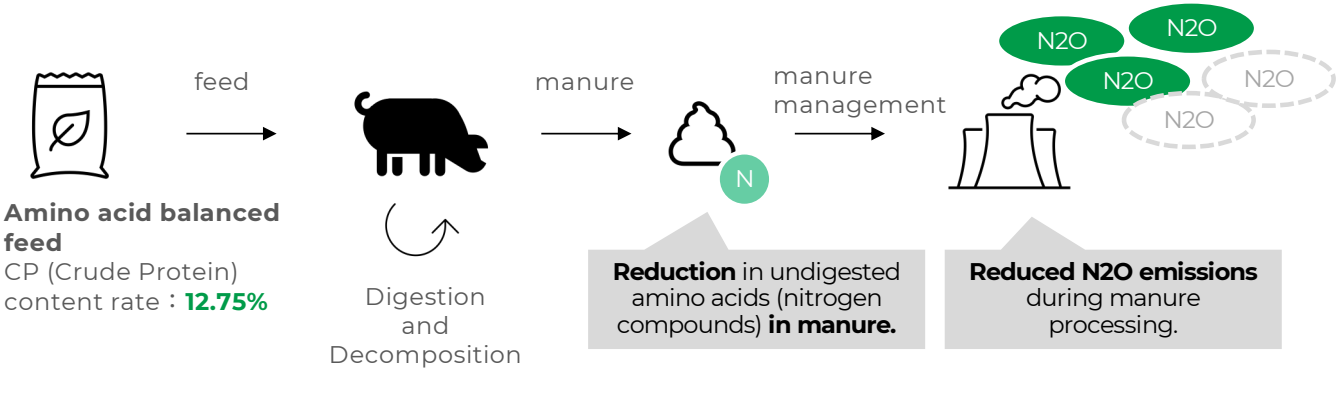
Credits can be obtained for the difference in GHG emissions between using conventional feed and using amino acid balanced feed.

AG-001 "Feeding Amino Acid Balanced Feed to Cattle, Pigs, and Broilers"

Conventional feed
CP (Crude Protein) content rate：14.5%

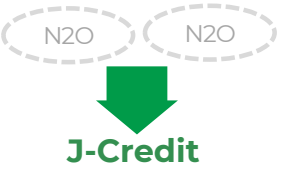


Amino acid balanced feed
CP (Crude Protein) content rate：**12.75%**



Reduction by AG-001

Credits are awarded for the reduction in GHG emissions achieved by feeding amino acid balanced feed compared to conventional feed.



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Reducing GHG emissions

- Improvement in CP rate of feed

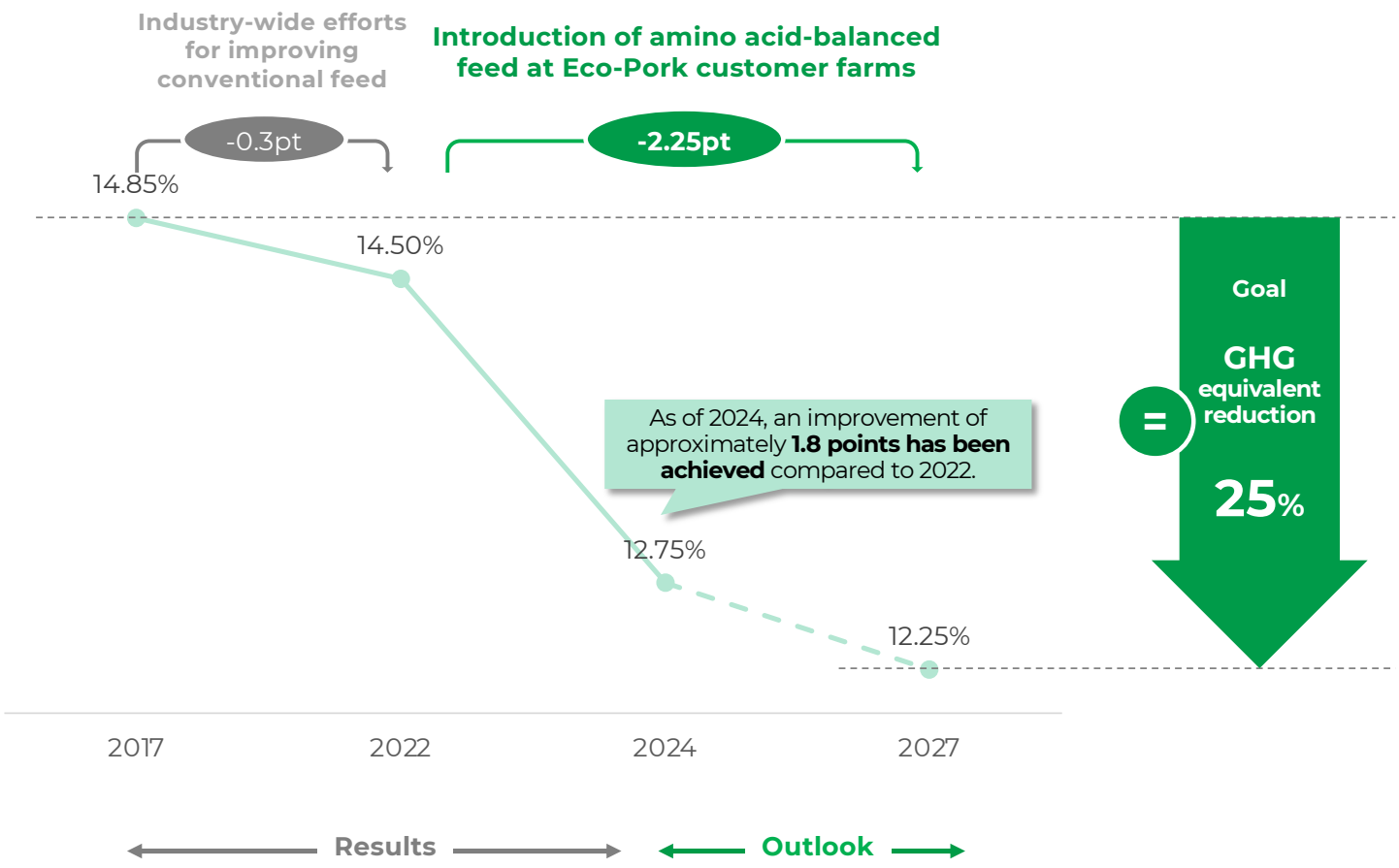
The CP rate has been on a downward trend across the industry, and our calculations show that the CP rate of conventional feed improved by 0.3 points from 2017 to 2022.

In the case of a farm that introduced Porker, switching to amino acid-balanced feed improved the CP rate by 1.8 points between 2022 and 2024.

Going forward, we aim to reduce the CP rate to the lower recommended value proposed by NARO (National Agriculture and Food Research Organization.)

Together with the farms that have introduced Porker, we will continue to work on improving the CP rate and contribute to a reduction of approximately 25% in GHG emissions.

Feed CP Rate Improvement Results and Outlook



Note: CP rates are calculated as the average weight gain before and after fattening.

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Reducing GHG emissions

- Additional value of using AI Buta(pig) Camera

Eco-Pork's AI Buta(pig) Cameras enable automatic acquisition of pigs' body weights. Traditionally, feed amounts in Japan are determined by broad weight ranges (30–50 kg, 70–115 kg, etc.), but with more precise weight management, feed can be optimized more effectively. This has the potential to reduce more GHG emissions than currently defined under AG-001.

By recording feed content in Porker, we will automate the calculation of GHG reduction, reducing the administrative burden on farms and enabling credit creation. As we further advance the introduction of Porker, we aim for a 25% reduction across the entire industry.

Initiatives:

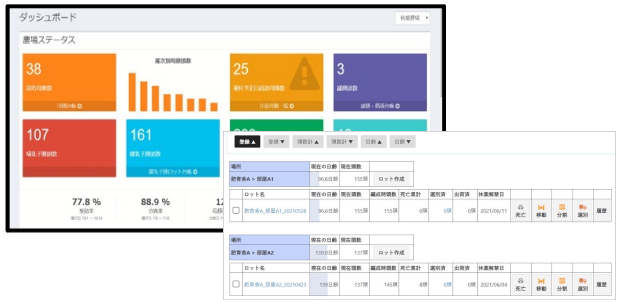
Optimizing body weight measurement and feed content with AI Buta Cameras

Porker

The AI Buta Camera automatically acquires body weight, allowing for more precise and optimized feed content compared to traditional feed standards. Furthermore, Porker is planned to include a feature that automatically calculates GHG reductions from production records and feeding data, reducing the administrative burden associated with credit creation.

AI pig cameras automatically acquire body weight and condition information
→ Automatic optimization of feed content based on weight category.
(Enhances meat productivity while automatically complying with AG-001)

Porker



We plan to enable automatic calculation of GHG reductions based on pig production records and feeding data (in compliance with AG-001).

Note: AG-001 is registered as a positive list (additional evidence for individual farms can be omitted), making it possible to start with AG-001 only for farms introducing Porker.

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【Reference】 Past Verification Results from NARO

The verification by NARO demonstrated that feeding pigs with amino acid balanced feed, which improves the amino acid profile, can reduce GHG emissions from manure by up to 40% without adversely affecting pig growth.

Due to these results, this method has been registered as an agricultural sector J-Credit.

Experimental Verification of Amino Acid Balanced Feed at NARO

NARO(2011) verified that feeding pigs with amino acid balanced feed can reduce GHG emissions from pig manure by up to 40% compared to traditional feed. This result led to the method being recognized as a credit under the domestic credit system and the Offset Credit (J-VER) scheme.

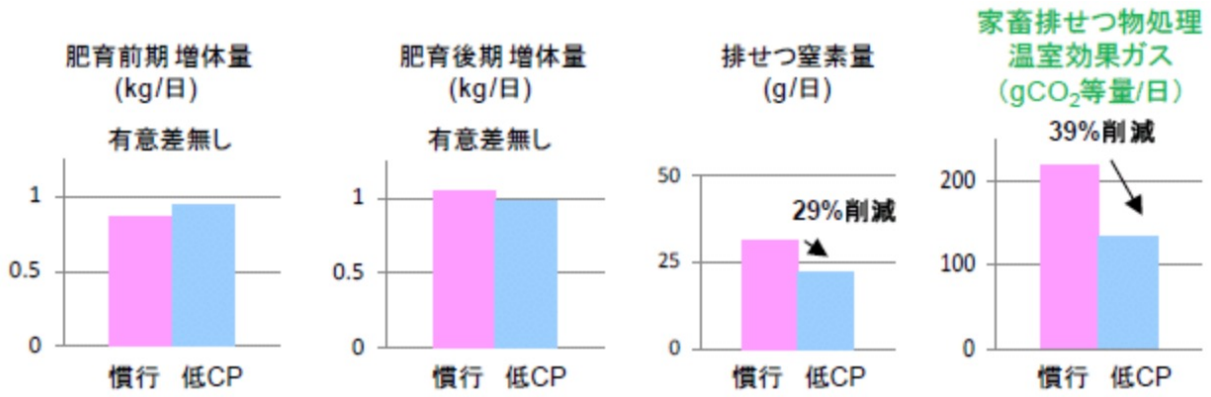


図 1. 肥育豚における慣行およびアミノ酸添加低蛋白質飼料給与による窒素排せつ量および排せつ物管理からの温室効果ガス発生量

Source: NARO (https://www.naro.go.jp/project/results/laboratory/nilgs/2012/210c0_01_45.html)
Notes: Offset Credit (J-VER) System: The predecessor to the current J-Credit System.

Eco-Pork

5

Impact Story

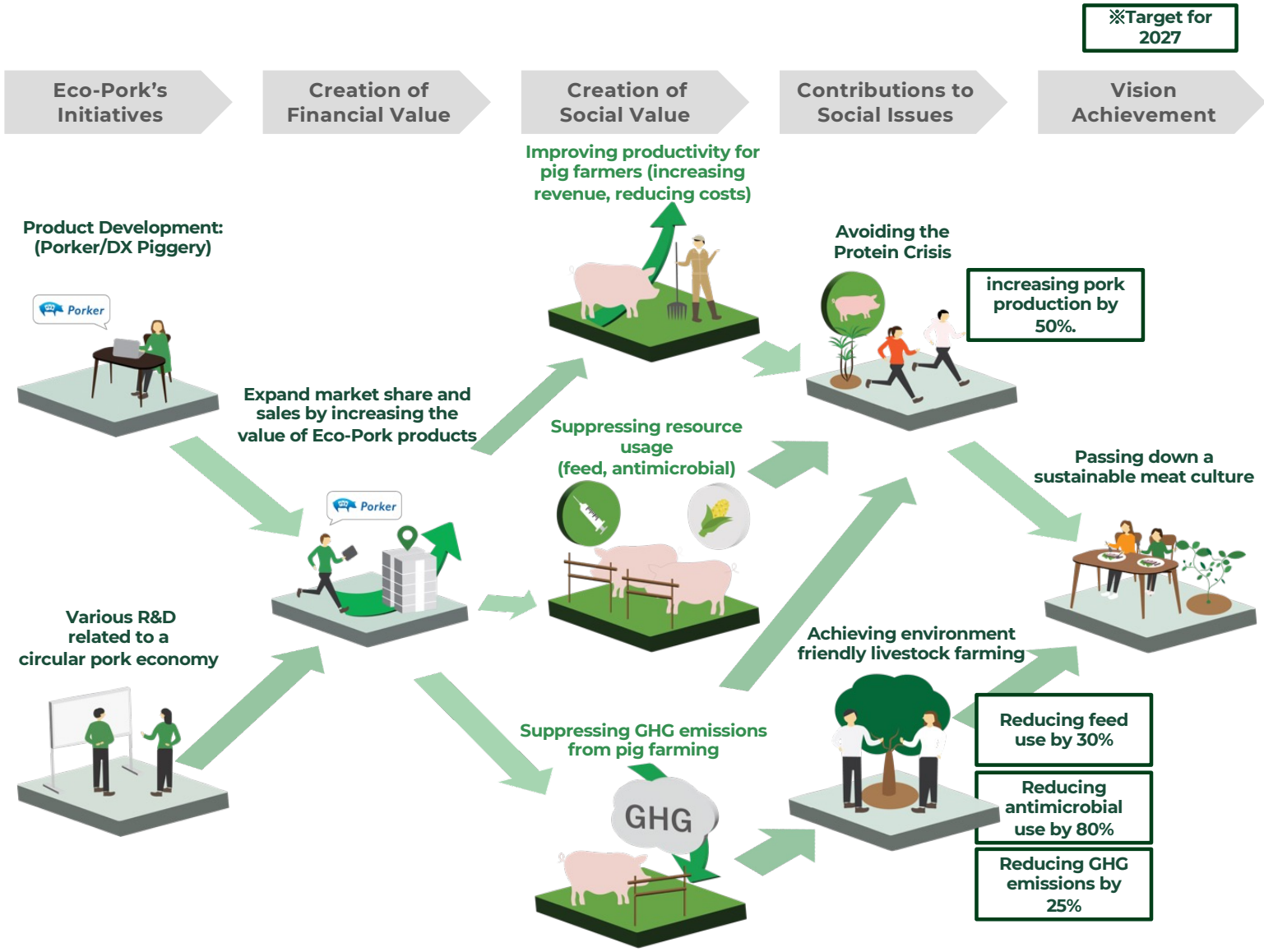
Eco-Pork

Impact Story

Our strategy is to provide innovative solutions and effectively implement our R&D outcomes to expand market share, drive sales growth, and generate social value.

By improving pig farming productivity, we benefit farmers and the livestock industry while also reducing resource use and GHG emissions, supporting environmental sustainability.

We are committed to tackling social issues like the protein supply crisis and the environmental impact of livestock production, in line with our vision of fostering a sustainable meat culture. To meet our 2027 targets, we have developed a logic model detailing the social values we aim to achieve.



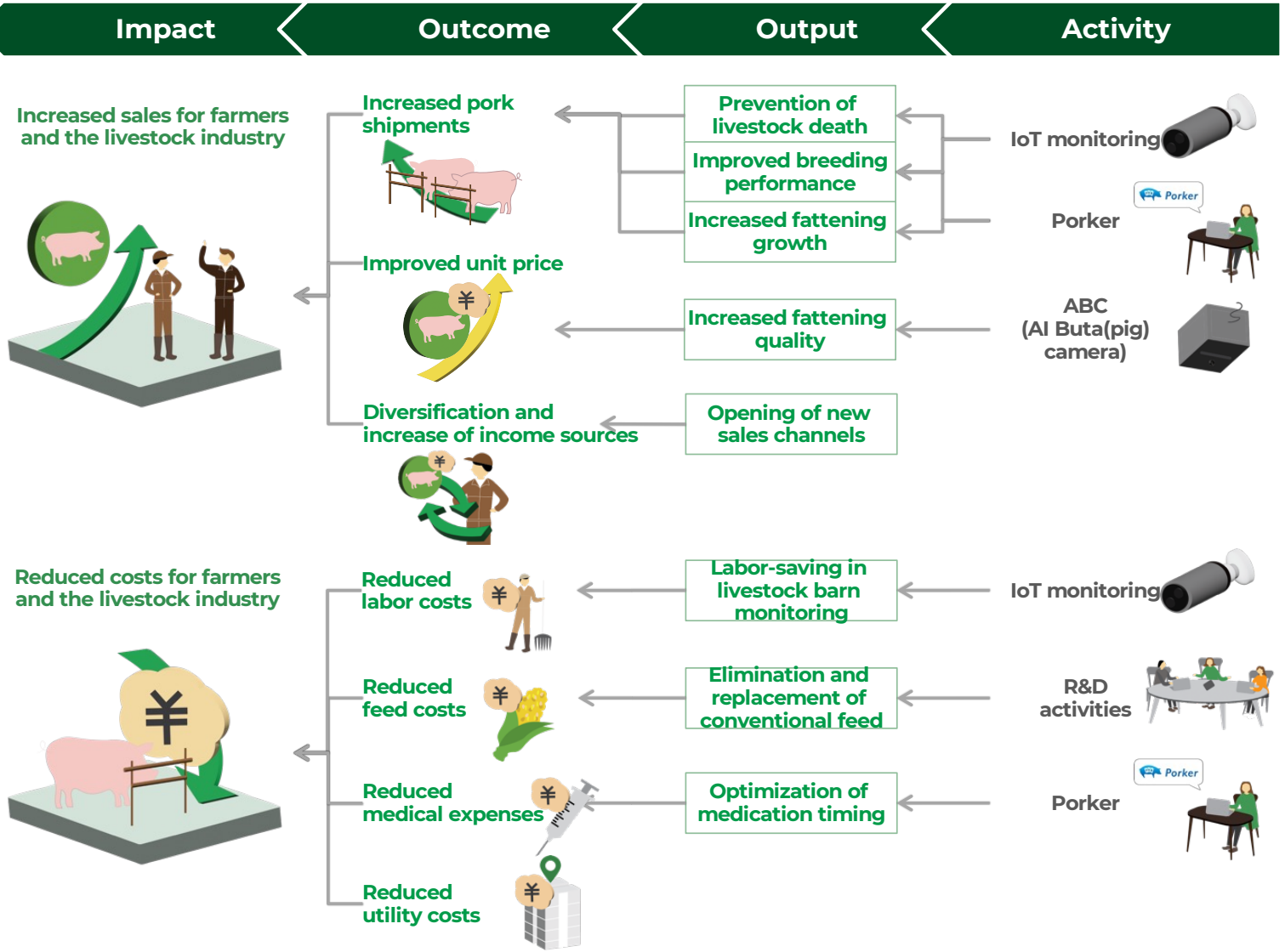
Eco-Pork

Logic model for Improving Productivity of Pig Farmers

We created a logic model that analyzes productivity into aspects of sales and costs and organized related activities accordingly. By introducing Porker, our farmer support solution, into farming operations, we help improve pig farming performance, increase shipment volumes, and contribute to higher sales for farmers.

Additionally, our AI pig camera accurately measures the pigs' body weight, enabling precise feeding, improving feed efficiency, and enhancing weight gain, which can lead to increased unit prices.

Our IoT monitoring solutions further contribute to enhanced productivity by optimizing farm operations through continuous monitoring of livestock and housing conditions.



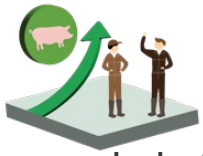
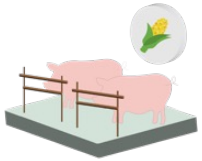
Eco-Pork

Quantitative Impact on Improving Productivity of Pig Farmers

We quantitatively estimated the impact of the introduction of Porker on increased sales for pig farmers.

Based on our market share as of November 2023, we calculated that the sales increase in the first year of Porker's introduction was approximately 5.37 billion yen.

Furthermore, we have confirmed that the effect of Porker has continued after the first year of introduction, and we expect that the effect will be even greater as more pig farmers introduce and continuously use Porker in the future.

Impact	Outcome	Output	Activity
Increased sales for farmers and the livestock industry	**Increased pork shipments**	**Improved breeding performance**	**Introduction of Porker**
			
Increased sales for farmers **5.37 billion yen** **Meat production volume increase** **10,000t/year**	**Shipment volume increase** **134,405 heads**	**Total piglets increase** **180,168 heads**	**Number of sows** **87,426 heads**
• The estimated carcass weight per pig is 74.7 kg. • **A total of 10,000 tons of carcass meat, equivalent to 6,700 tons of trimmed meat, reached more consumers.** • This calculation is based on the shipment weight, carcass yield, and transaction price per carcass. The price per kilogram of carcass meat is approximately 536 yen (MAFF, 2022). • **Farmers' sales increased by 5.37 billion yen.**	• **74.6% of the total number of piglets produced have been shipped.** • Based on the ratio of total piglets produced to the number shipped, we calculated the increase in the number of shipments. • The total number of piglets produced is 29.44 per sow (12.8 piglets × 2.3 farrowings), and the number of piglets shipped is 21.97 per sow (5,846,629 piglets shipped ÷ 266,116 sows), resulting in a shipment rate of 74.6% (JPPA, 2022).	• For farms that have introduced Porker, the total number of piglets produced **improved by approximately 7% in the first year.** • On average, the number of piglets produced has continued to improve by around 2% annually in subsequent years. • The average sow turnover rate is 2.3, and the average number of piglets per litter is 12.8 (JPPA, 2022). • An improvement of 0.896 piglets, representing 7% of 12.8 piglets, was calculated as the first-year effect of introducing Porker.	• As of October 2023, **the number of sows on farms that have adopted Porker is 87,426**. • The total number of sows in the country is 791,800 (MAFF, 2022), representing **approximately 11% of the national share.**

Source: Ministry of Agriculture, Forestry and Fisheries, Japan Pork Producers Association, Our Porker data

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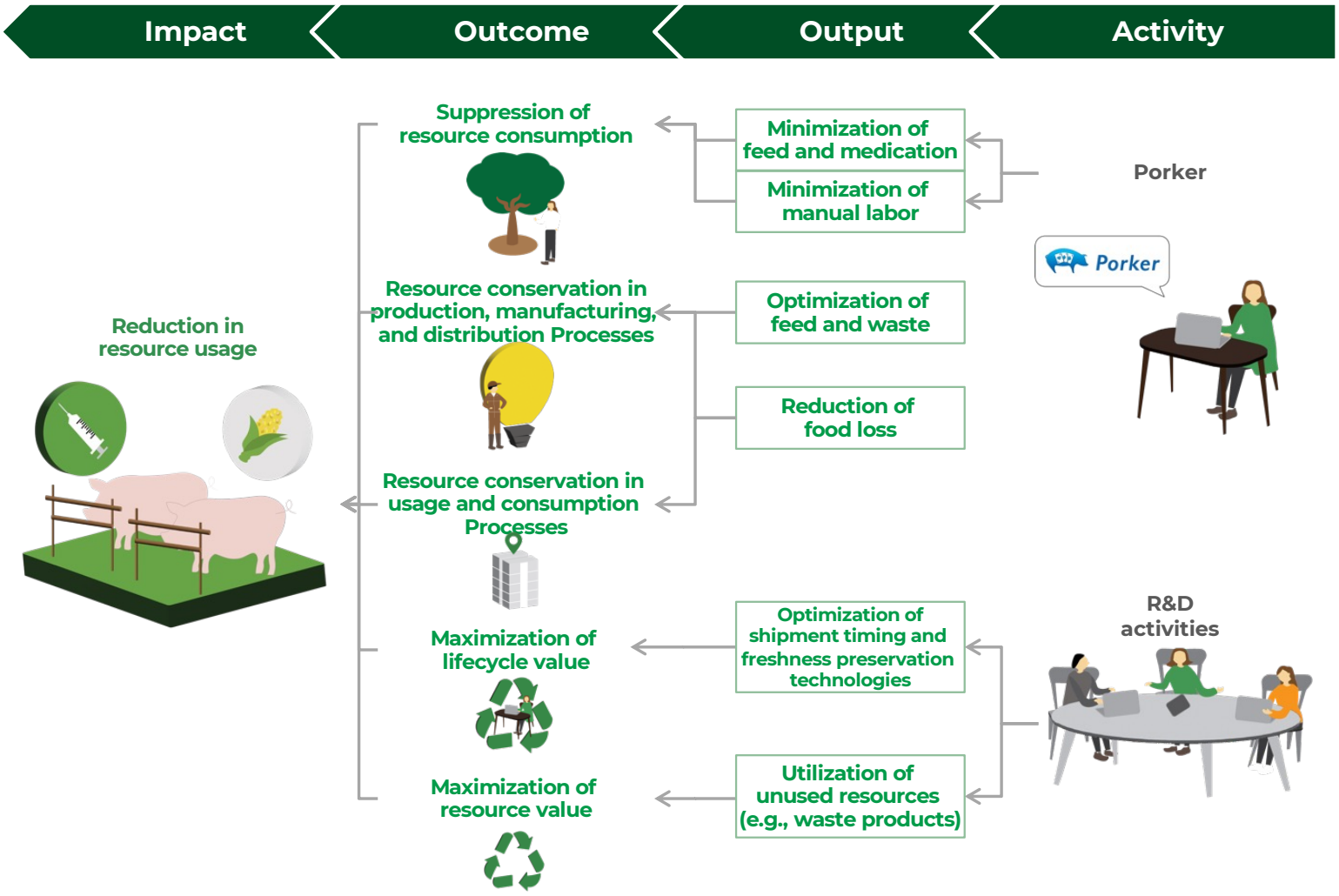
Logic model for Reducing Resource Usage (Feed and Antimicrobial Use)

To reduce resource usage, a comprehensive approach is necessary, including not using resources in the first place, minimizing usage in each process (resource conservation), and maximizing resource value throughout the entire lifecycle, including reuse and recycling.

As mentioned earlier, reducing feed usage and the use of antimicrobials in pig farming are important social issues. We aim to reduce feed usage by 30% and antimicrobial use by 80% by 2027, and we are advancing various initiatives to achieve these targets.



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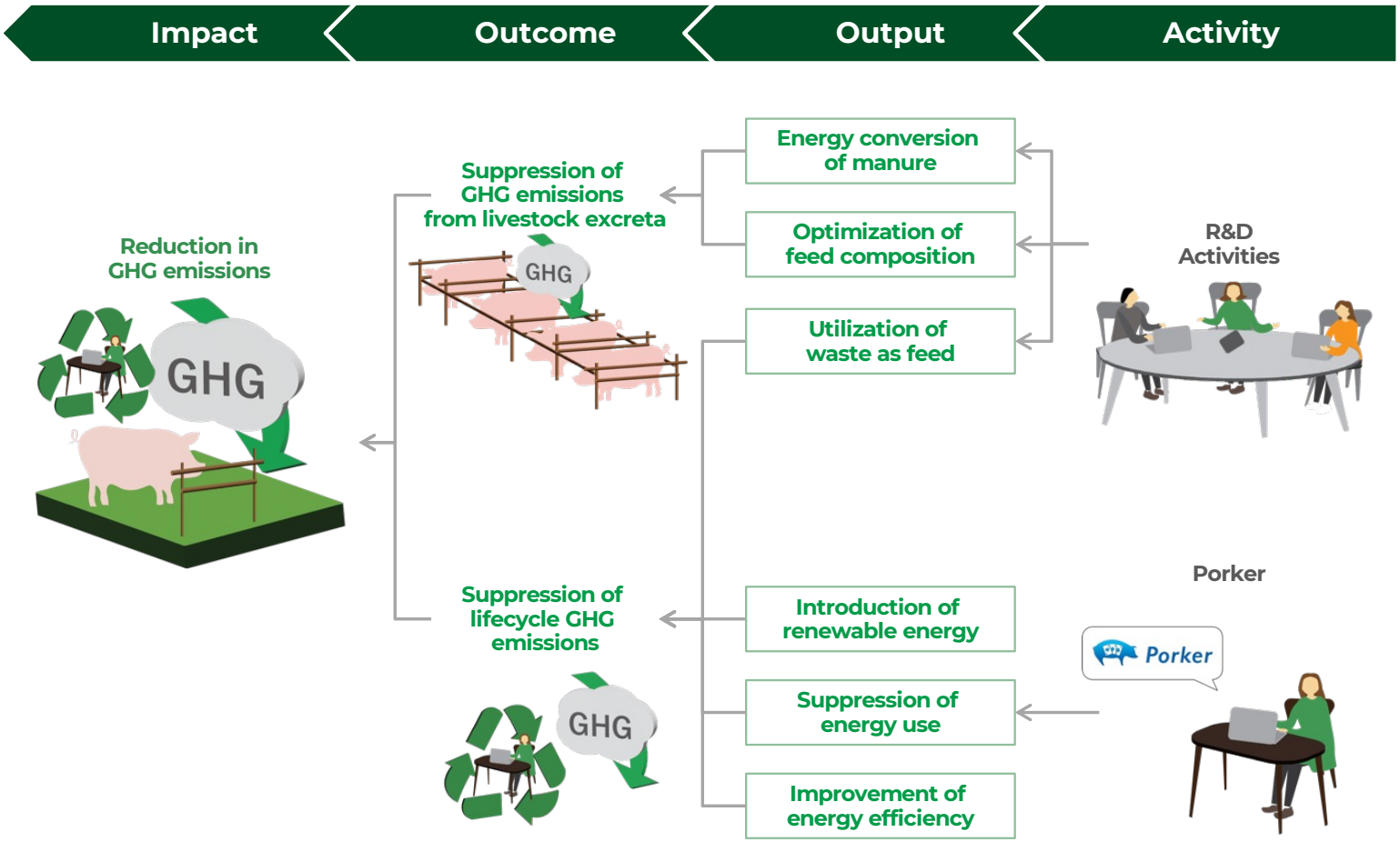
Logic model for Reducing GHG Emissions

Regarding GHG emissions, we believe that it is necessary to reduce not only the GHG emitted from livestock but also the GHG emissions across the entire lifecycle of pig farming.

We are aiming to reduce GHG emissions by 25% by 2027 and are advancing various initiatives to achieve this goal.



Disclosure of the IMM Process

In order to realize our vision of co-creating a circular pork economy using data and passing down meat culture to the next generation, we believe it is important to incorporate impact into business promotion and management decisions.

Our company has also defined the objectives and processes for Social Impact Measurement and Management (IMM), and we plan to regularly share information through impact reports in the future.

While this report focuses primarily on positive impacts, we will also conduct IMM considering major negative impacts and risk factors within the industry.

Purpose of Eco-Pork's IMM

Define key impact indicators based on the concept of "passing down meat culture to the next generation."
Evaluate the status of business promotion from both financial and impact perspectives and utilize this information for management decisions.

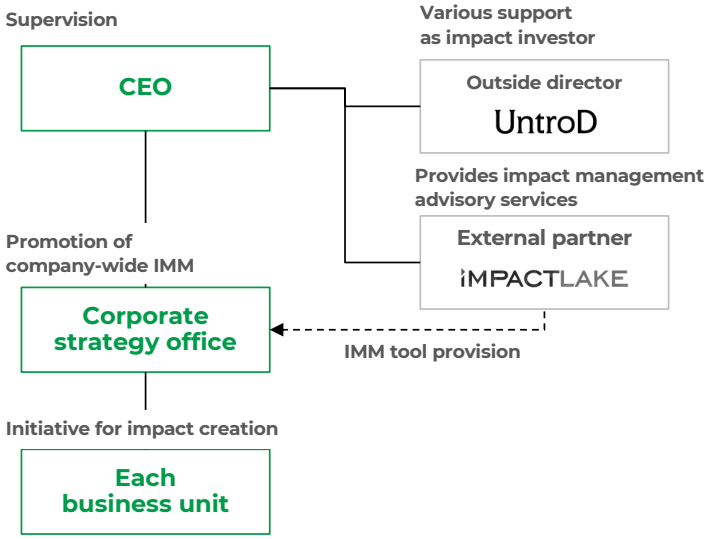
Impact Indicators and Targets

Impact Indicators and Targets (by 2027)
(compared to 2017)

- Increase pork production by **50%**
- Improve feed efficiency by **30%**
- Reduce GHG emissions by **25%***
- Reduce Antimicrobial use by **80%**

* The GHG emission reduction target incorporates the overall improvements across the industry, including our own initiatives. As Eco-Pork, we aim to contribute an additional 20% reduction through our business activities.

IMM Implementation Structure



Data company for sustainable
Pork Ecosystem