The Sustainable Farming for the Future

Initiatives in Denmark and the realisation of sustainable livestock production

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NTT TechnoCross Corp

NTT-TX

Self Introduction

Name : Yasuyuki Takahata

Organization : IOWN Digital Twin Department at NTT TechnoCross Corporation

Work experiences :
- Engineer, software development for mobile phone (201-2008)
- Team leader, OS analysis, software testing etc.. (2009-2013)
- Product manager, product development (20014-now)

Hobbies : Playing and watching Football

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Introduction

Corporate Profile

|	
Company Name	**NTT TechnoCross Corporation**
Corporate Headquarters	Granpark Tower 15F. 3-4-1, Shibaura, Minato-ku, Tokyo, 108-8202, Japan
Established	• July 2, 1985 (NTT Software) • June 3,1987 (NTT-IT) • April 1, 2017 (NTT TechnoCross)
President & CEO	Atsuko Oka
Operating Revenue	47.522 billion yen (as of March 2023)
Number of Employees	1,885 (as of the end of March 2023)
Business Areas	• Development and sales of software solutions • System integration services and consultation • Networking system services • Other business activities related to the above

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Overview

U-motion® * is a service which monitors information obtained from our original device installed in cattle 24h a day, 365 days a year.

The motion data from U-motion® sensor are sorted and visualized as graph.
By combining these data, U-motion® detects disease symptom and heating to inform farmers, veterinarians, AI technicians.
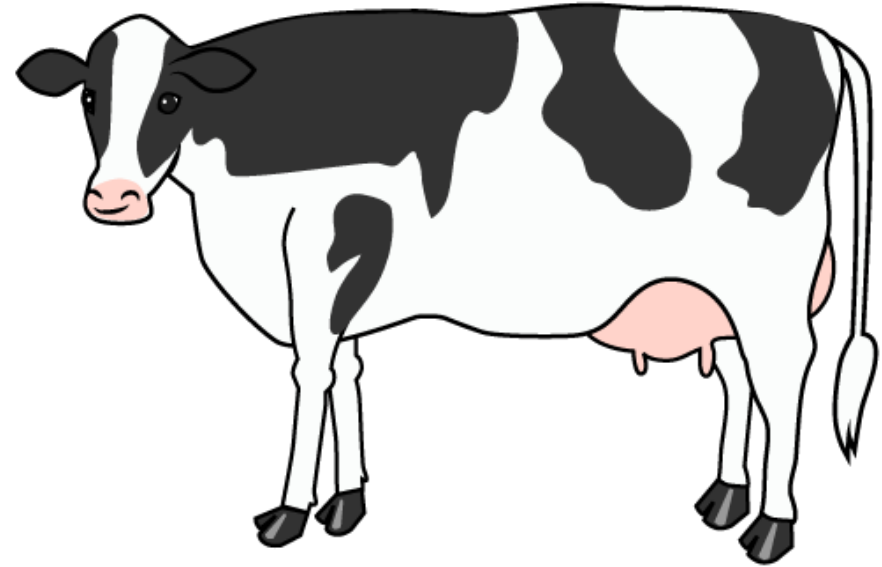
U-motion® is provided as a service by
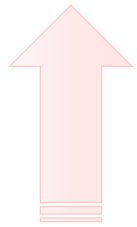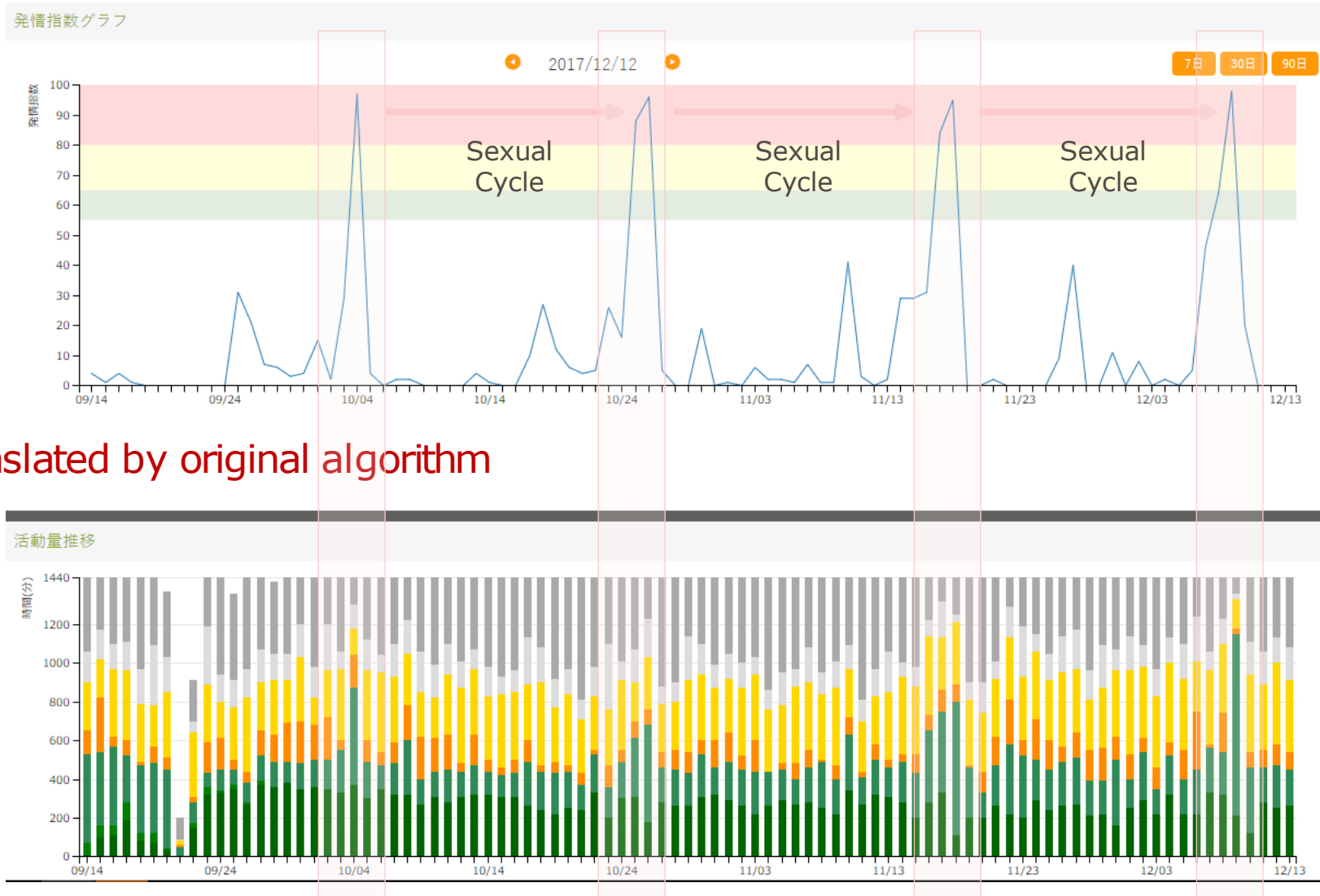**DESAMIS** Co.,Ltd ※ in Japan

Monitoring Behavior

Y717

活動量推移

* : https://www.desamis.co.jp/
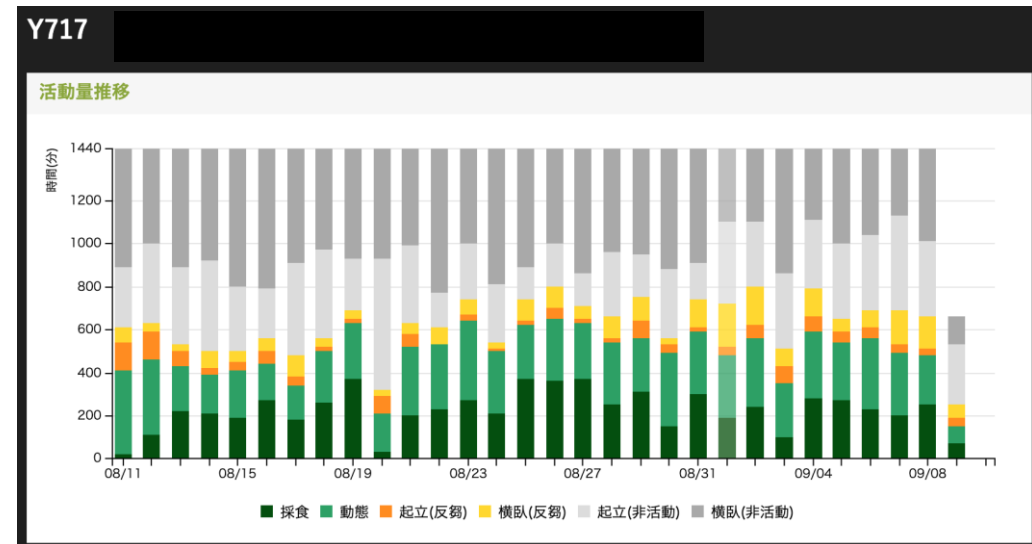
IoC

Internet of Cattle

Alerts – Heat detection

Heat Indicator

Translated by original algorithm

Activity Data

Alerts – Disease detection
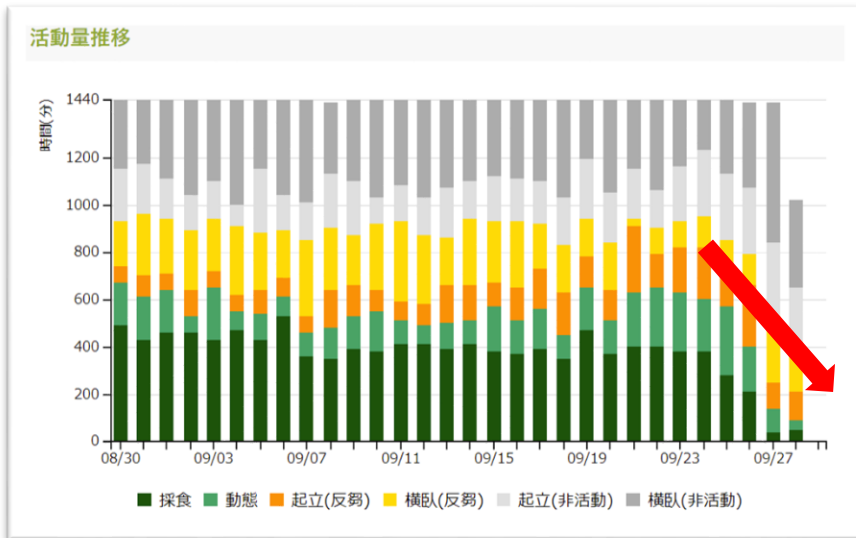
Concept

Output

Input

Milk Production

Reproduction

Disease

Feeding

Heat Alert

Disease Alert

Feed Caution

Health Control

To be more productive, control from health
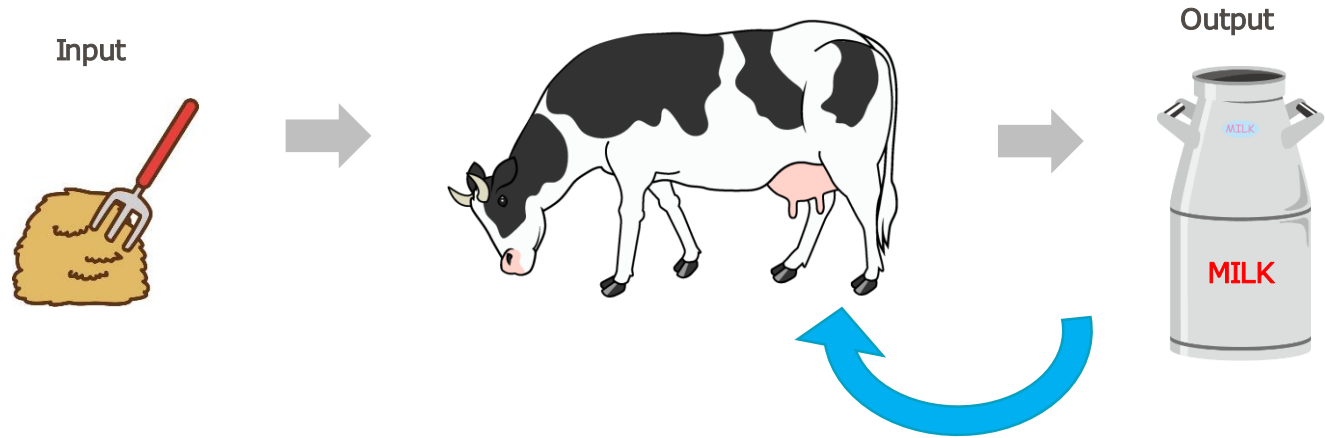Because both Production and Reproduction are based on health

U-motion® can provide total management system to take care of
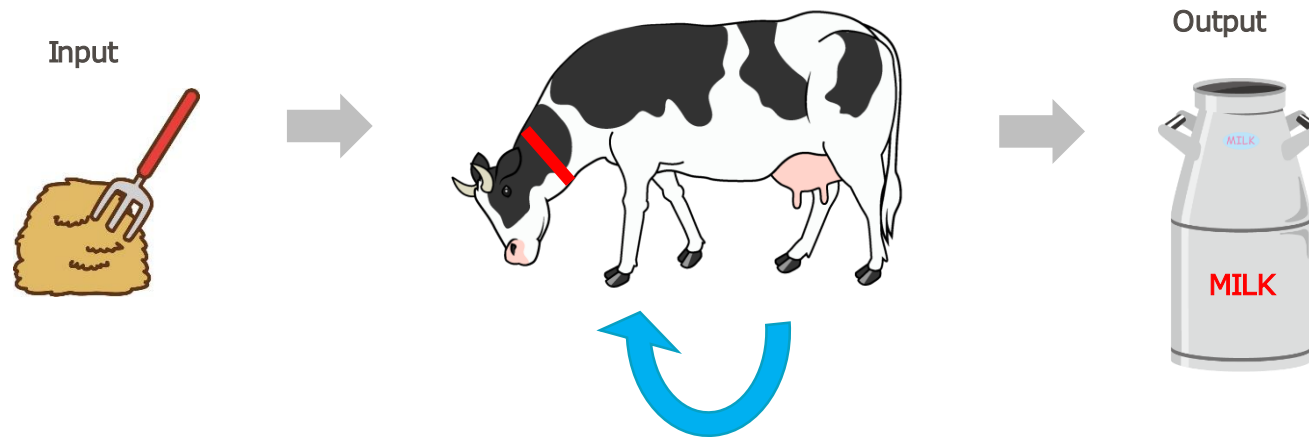cows and then improve productivity

Feeding (Eating Time) Control

Current :

Input

Output

Feedback from Milk Yield

With U-motion ® :

Input

Output

Feedback from Eating Time

One of the most powerful feature is early feedback

You will be able to act earlier than before

Feeding Control in Disease

✓ Early Detection

Confirmed displaced abomasum

Death

Milk Amount

Milk Amount (kg)

50
40
30
20
10
0

Lying Time

Lying time (min)

1500
1000
500
0

Activity Time
*1

Activity time (min)

800
600
400
200
0
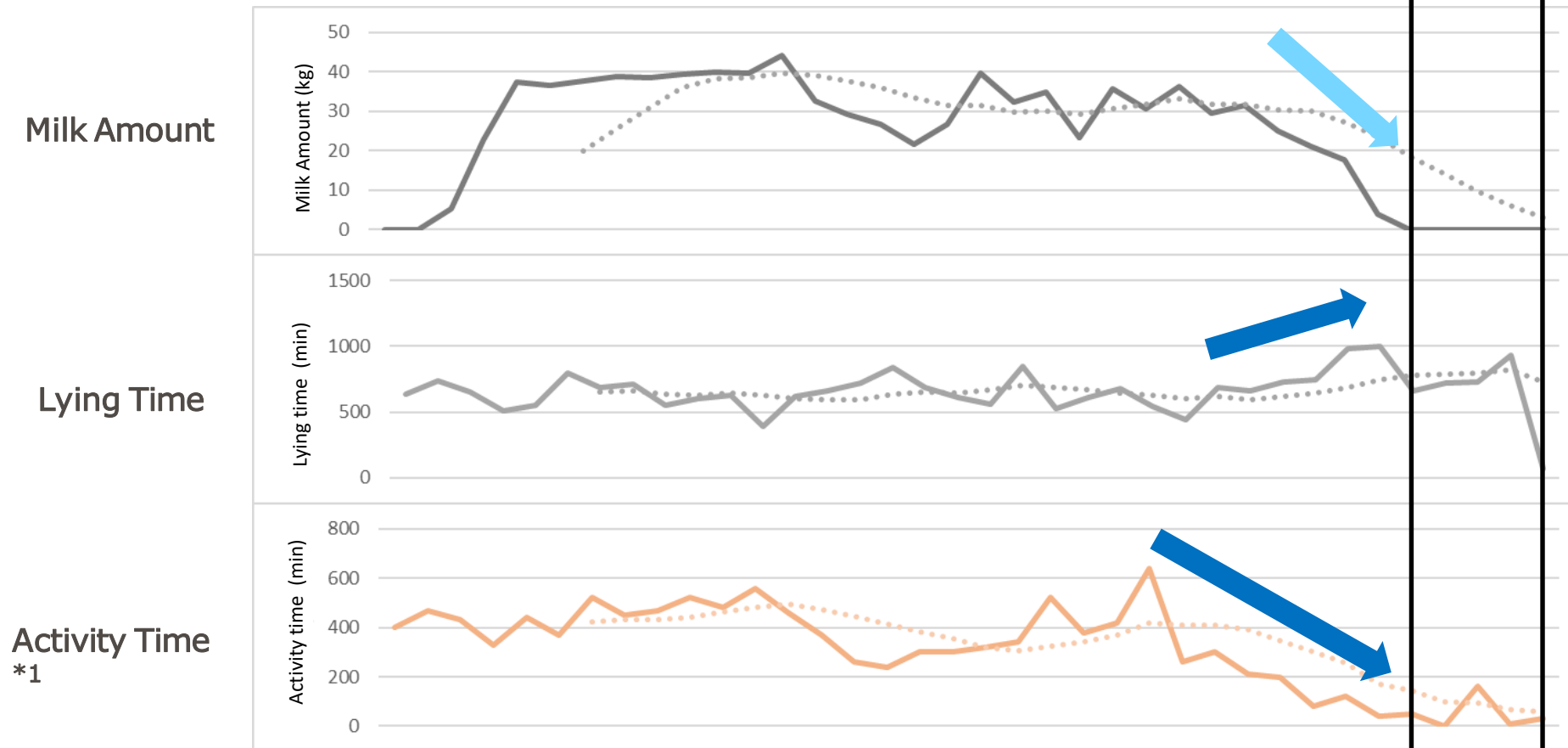
- Lying Time increased **1 day** earlier than milk reduction. *2

- Activity Time reduced **2days** earlier. *2

U-motion® will tell you this as **Disease Alert**

*1：Including Eating Time   *2：This is one result in a farm in Japan and we do not guarantee the same result in all cases .

Installation results

U-motion® have been installed in more than **900** farms,

and more than **200,000** cattle in Japan

Initiatives in Denmark

The beginning..

We received inquiries from the Denmark embassy about other products called "Digital-Mekan" which estimate the weight of pig by taking picture
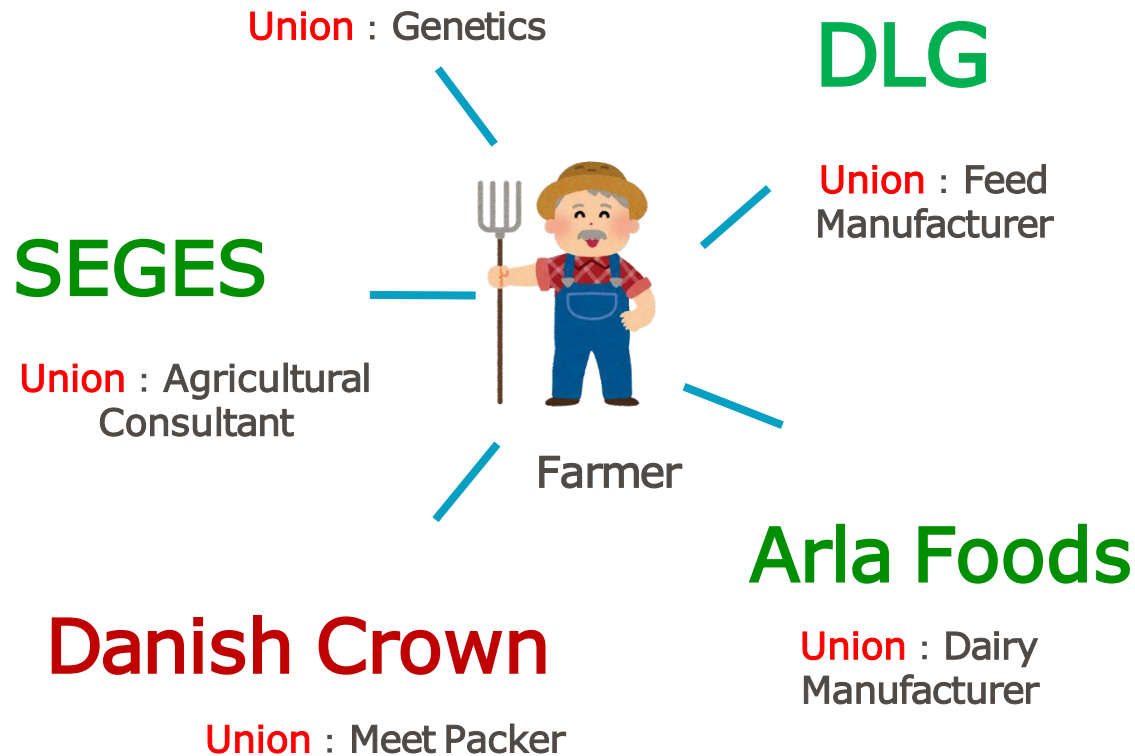

Which gave us the **opportunity to introduce our company and products** to SEGES and other Danish organizations when they visited Japan.

Why Denmark ?

Unique industrial structure

Viking Genetics

Union : Genetics

DLG

Union : Feed Manufacturer

SEGES

Union : Agricultural Consultant

Farmer

Arla Foods

Union : Dairy Manufacturer

Danish Crown

Union : Meet Packer

- 90% farmers use the same DB(DMS) and ship milk to the same dairy manufacturer

  ➡ **Number of stakeholders are limited and information is aggregated**

- The most of organizations are Union and owners are farmers

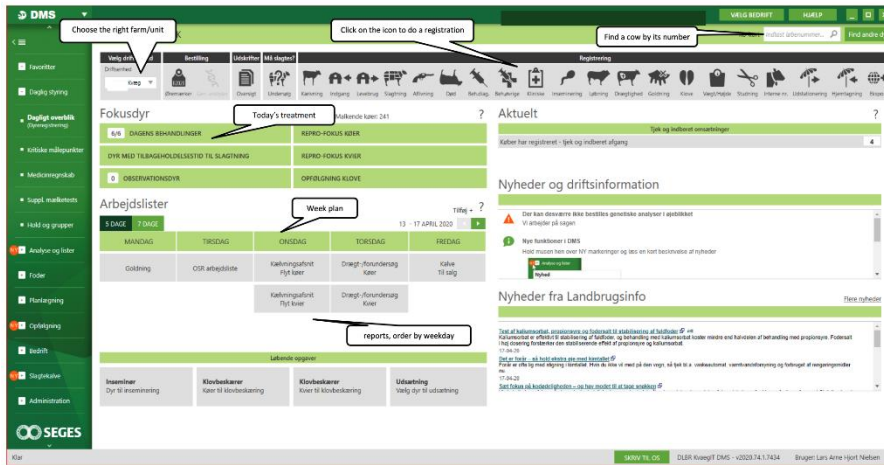 ➡ **Everyone has the same goal of farmer's profit**

This is the ideal environment to **create new innovations and solve large social issues.**
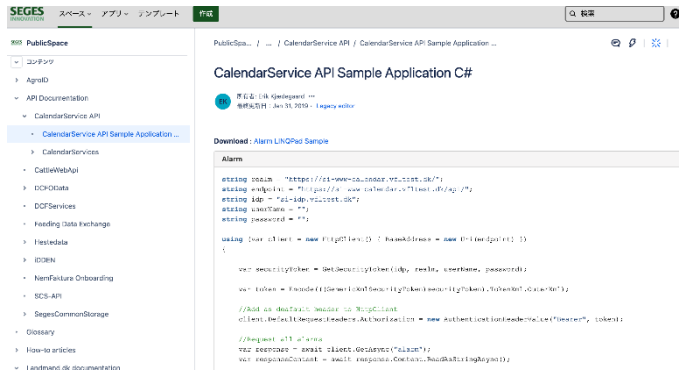
Why SEGES ?

Best partner for collaboration

- They serve as a **bridge** to introduce research results into actual agricultural fields.

- They operate DB called **DMS which is used by almost all farmers** and publish API for open use

- They **test new methods on behalf of farmers** and introduce new technologies to farmers

Test U-motion® in Danish farm.

SEGES Farm Test

Purpose :

The purpose of this study was to test the ability of U-Motion® to detect heat and disease during the lactation period.

Period :

Heat detection   : 12.2019 – 06.2020 (Blind Test) / 06.2020 – 10.2020 (Open Test)
Disease detection :   12.2019 – 03. 2020 (Pilot Test)

> Test to determine test method

Pilot test of disease alert
Test of the ability of U-motion® to detect diseases during the lactation period

Test of heat detection alert
Test of the ability of U-Motion® to detect heat during the lactation period

Results

Heat detection :

Heat detection rate for cows 40 to 150 days after calving is **80−83%**

(Criteria : 75%)

Heat detection rate for pregnant cows is **96.5%**

(Criteria : 90%)

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Results

Disease detection :

It was founded the difficulty of defining the disease and evaluating quantitatively.
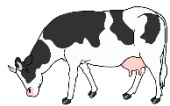But We confirmed certain level of Customer Satisfaction

U-motion® can detect acute disease and Escherichia coli mastitis

U-motion ® have found diarrhea or ruminal acidosis

It is as good as other systems. Integration with DMS is preferable.

Realisation of sustainable livestock production

Arla Foods

SUSTAINABILITY ON FARMS

83% emissions come from farms

Dairy is part of a healthy and sustainable diet due to its nutrient density. And, as is the case for all food production, it comes with a carbon cost. As part of the food industry, we have a great responsibility — and at the same time a great opportunity — to do something about it. 83 per cent of our emissions come from farms, so that is where we focus most of our efforts to reduce our carbon footprint.
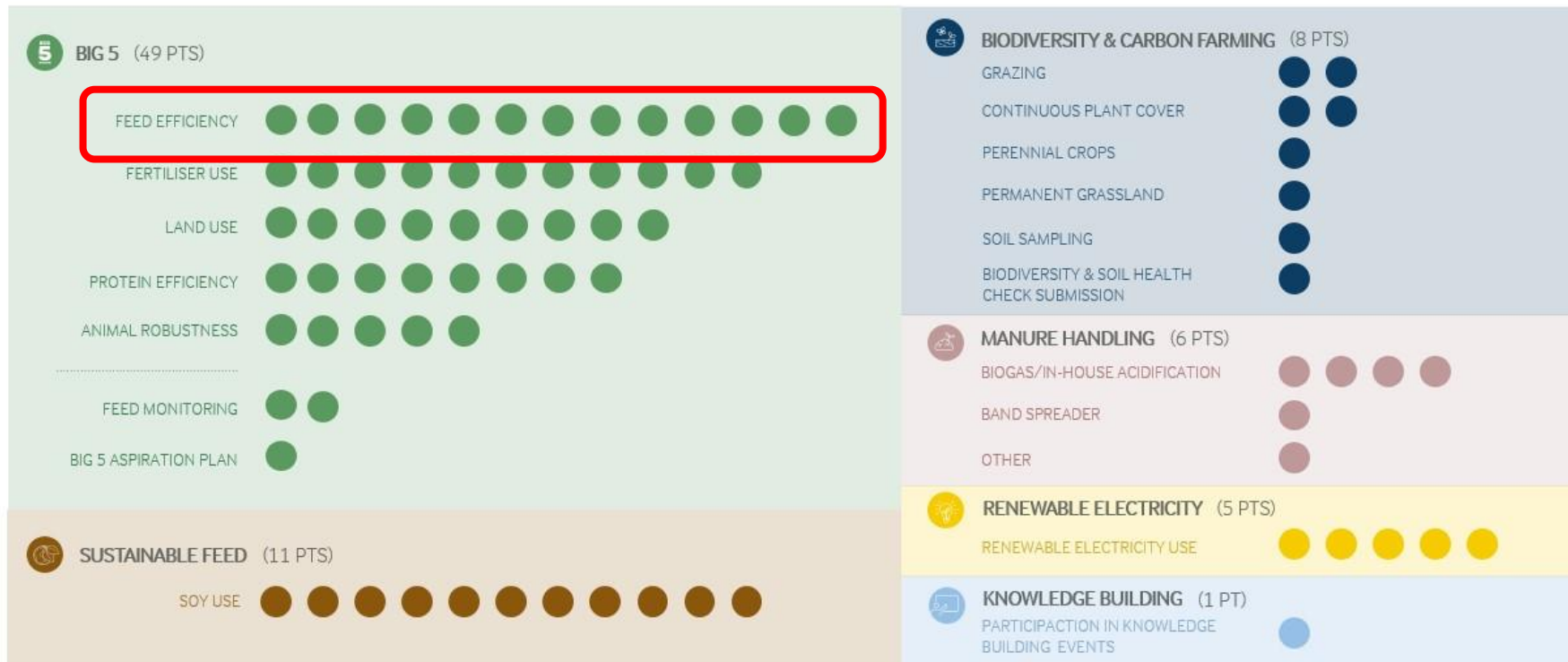
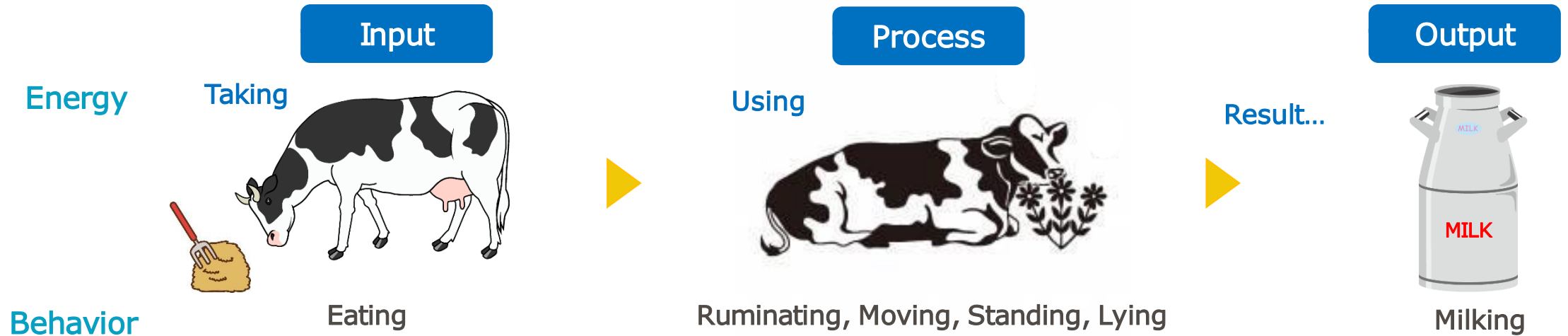**Improving Feed Efficiency is one of the most effective approach**

Viking Genetics

"The Nordic farmers will benefit from the CFIT 3D camera system by requiring less feed to produce the same amount of milk. We will see further genetic progress for feed efficiency that contributes to more climate-friendly cows," says Lars Inge Gunnarsson, Chairman of the Board at VikingGenetics.

In the field of genetics field, feed efficiency is also becoming important indicator.

Sources: https://www.vikinggenetics.com/news/feed-efficiency-takes-a-major-step-forward
https://www.vikinggenetics.com/about-us/innovative-breeding/ntm/saved-feed

Energy & Behavior

Input	Process	Output
Taking	Using	Result...

Energy

Behavior

Eating | Ruminating, Moving, Standing, Lying | Milking

	Eating	Ruminating	Moving	Standing	Lying
Product A (Neck)	-	○	○	○	-
Product B (Leg)	-	-	○	○	○
Product C (Neck)	○	○	○	○	-
U-motion®	○	○	○	○	○

Our responder can monitor **all main behavior** from Input to Process

Example
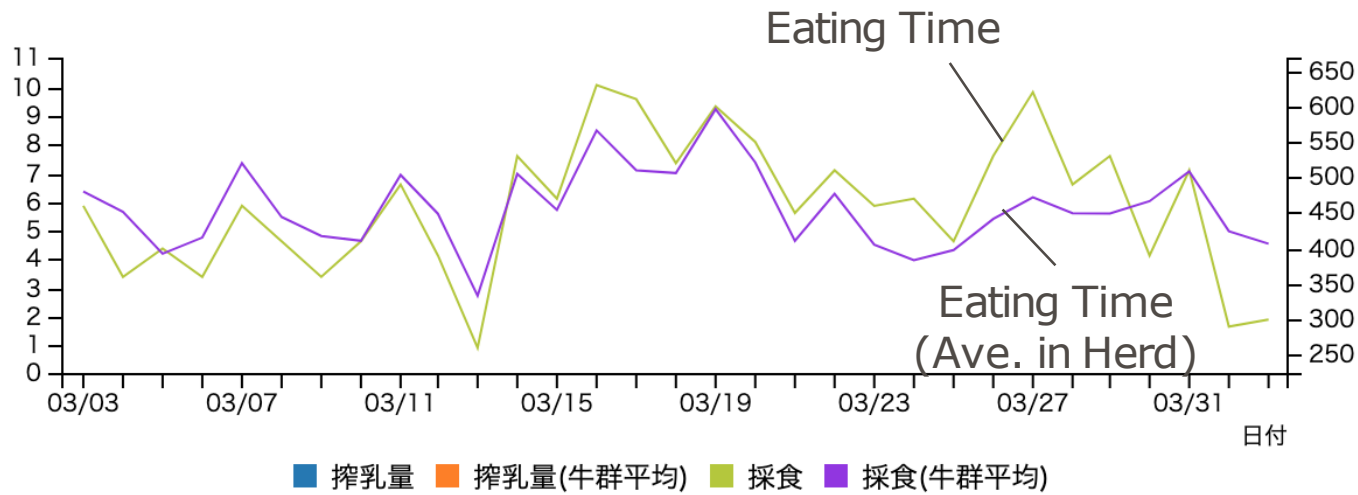
Input
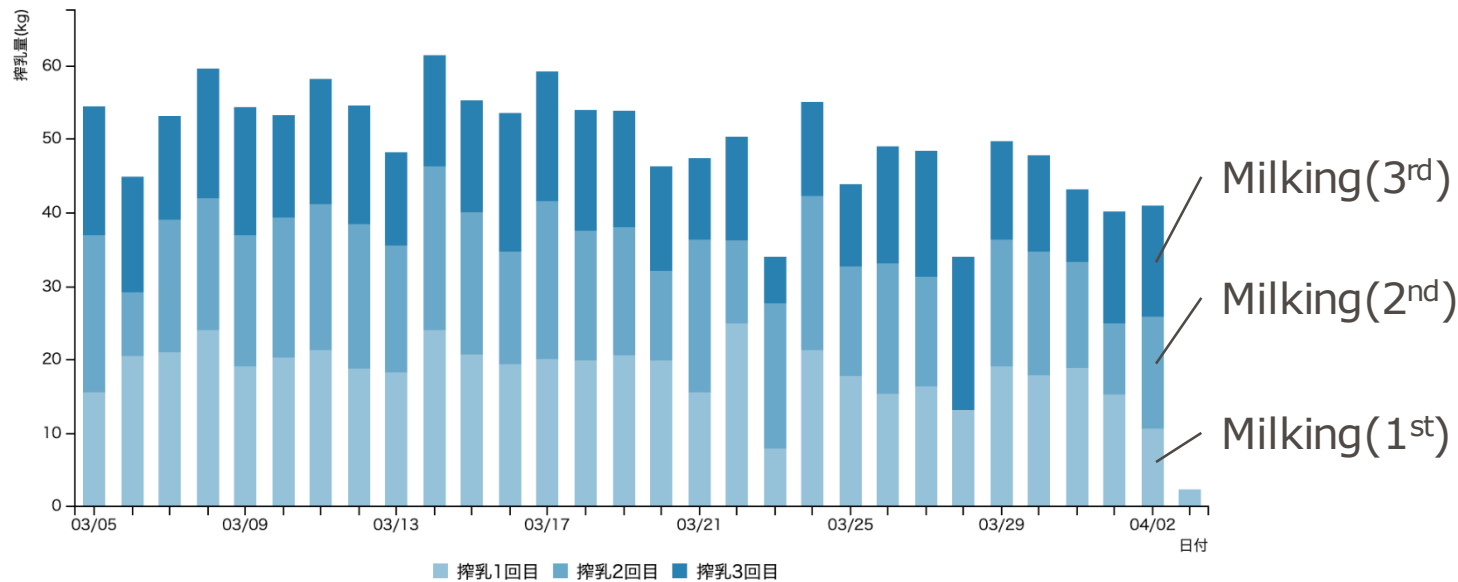
- ✓ U-motion® can show Eating time(Input)

- ✓ DMS can show Milk yield(output)

for each individual cows

▼

If we customize a little bit..

We may be possible to show DMI and Feed Efficiency for each individual cows

Example

Table 1 Recommended feed efficiency (FE) for cows in various lactation groups and stages of lactation

Group	Days in milk	FE*
One group, all cows	150 to 225	1.40 to 1.60
First-lactation group	<90	1.50 to 1.70
First-lactation group	>200	1.20 to 1.40
Second-plus lactation group	<90	1.60 to 1.80
Second-plus lactation group	>200	1.30 to 1.50
Fresh cow group	<21	1.30 to 1.60
Problem herds/groups	150 to 200	<1.3

*These recommendations are based on energy-corrected milk values.
Source: M. Hutjens, University of Illinois.

Easy to find Problem Individual cows

&

Easy to determine Replacement cows

Case Study

Case

A farm who has 400 cows and change barn to compost barn

Hypothesis

- Increase eating time
- Increase milk yield

Result

- Reduced eating time
- Increased milk yield

Case Study

- **Increased Lying time**

Conclusions

It seems that they could not eat enough because eating time was reduced, and leftover was increased at first.
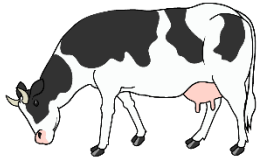However, actually the improvement in the cowshed environment **increased lying time, and lead to increase the feed efficiency**. As a result, increased in milk production.

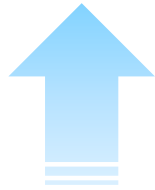Our responder can **visualize and quantify** the action farmer taken
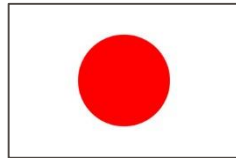
Continuously..

Benefit

Improve Animal
Welfare

Increase
Revenue

Improve Climate
Environment

Cooperate with

Working on together!

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Thank You!

Mange Tak!