

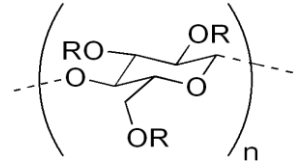
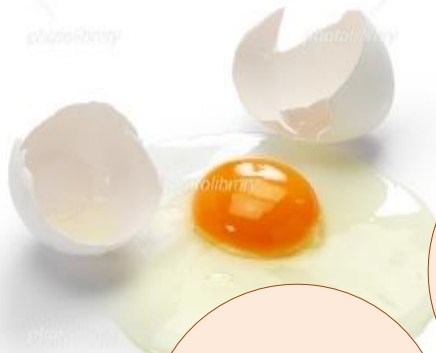


2021.09.16  
Koji OCHIAI

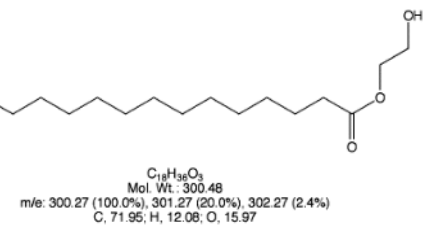
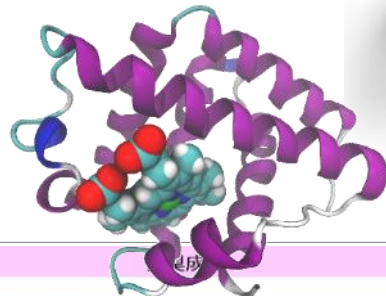
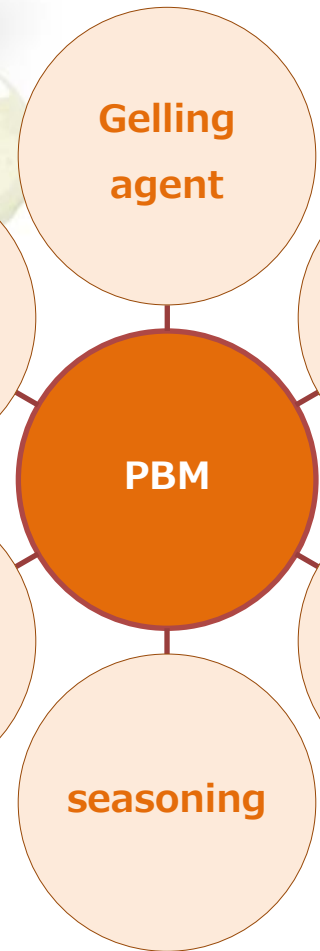


<b>Company name</b>	DAIZ Inc. (Formerly known as DAIZ Energy, Inc.)
<b>Business Description</b>	Development, manufacturing and sales of plant-based meat Development, manufacturing and sales of food products that use functional substances derived from soybeans
<b>Date of Establishment</b>	December 1, 2015
<b>Capital</b>	1,240 million yen (cumulative capital of 3.75 billion yen)
<b>Shareholders</b>	Founder Kajitsudo Co., Ltd. The Norinchukin Bank Nichirei Foods Inc. Ajinomoto Co., Inc. NIPPON STEEL TRADING CORPORATION Kanematsu Corporation KANEMATSU FOODS CORPORATION ENEOS Innovation Partners LLC. KICHIRI HOLDINGS & Co., Ltd. T.HASEGAWA CO., LTD. Mitsubishi Chemical Holdings Corporation
<b>Representative</b>	Tsuyoshi Ide (Founder), President and Representative Director

# Japan must not be late Food Tech [Soy Meat]



R = H or CH<sub>3</sub>



主な獣臭成分	
 Skatol (牛乳、羊乳、豚肉) 哺乳類の糞(消化管内でトリプトファンから合成される)、強い臭気を持つ、低温では花の香りを呈する。	 Indol (豚肉) バクテリアによってアミノ酸トリプトファンの分解産物として生成。大便を特徴する。非常に低濃度の場合花のような香りがあり、オレンジやジャスミンなど多くの花の香りの成分。
 フィテン1 (草類、ボール状種)	 フィテン2 (草類、乾草類)
 O-Cresol, M-Cresol, P-Cresol (牛乳、羊乳) 同様のフェノール様の臭気、主に牧草由来。	 Phenol (羊乳) 酸味のあるフェノール臭。
 4-Ethyl octanoic acid (羊乳) いわゆるマン臭の原因物質のひとつ。	 4-Methyl nonanoic acid (羊乳) いわゆるマン臭の原因物質のひとつ。
 n-Butyric acid (豚肉) 豚肉の臭気の原因でもある、足の臭気の原因。	 iso-Valeric acid (豚肉) 足の臭気の原因は、このイソブチ酸が原因。
 4-Heptenal (羊乳) 強い臭気の原因、量が少ないとフレッシュクリーム臭に似る。	 beta-Ionone (牛乳) 甘いワッヂイ、スマイレ等の強い香り。主にbeta-カロチンや牧草由来。
その他に Methyl mercaptan Carbon disulfide Thiazole など	



# Seed germination platform



Seed

Core technology

OGM

(Ochiai germination method)



Plant

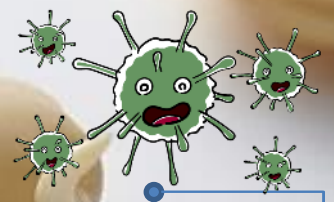
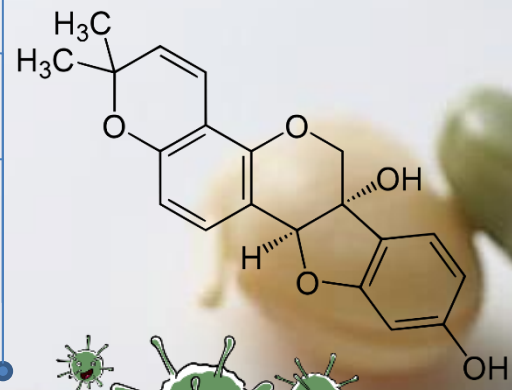
Patented

# 1 Food Tech

O<sub>2</sub>

CO<sub>2</sub>

Temperature



Elicitation

Induce Phytoalexin

## 2 Drug Discovery

# Composition formula of induced secondary metabolites 30,000 compounds

30,000 Compounds

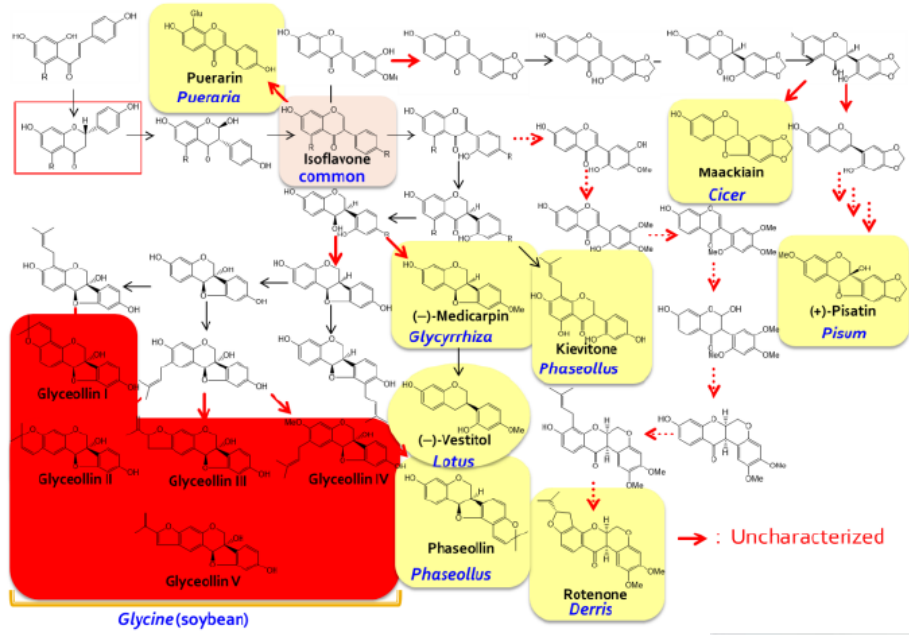
S7

5.86197757002083E-14

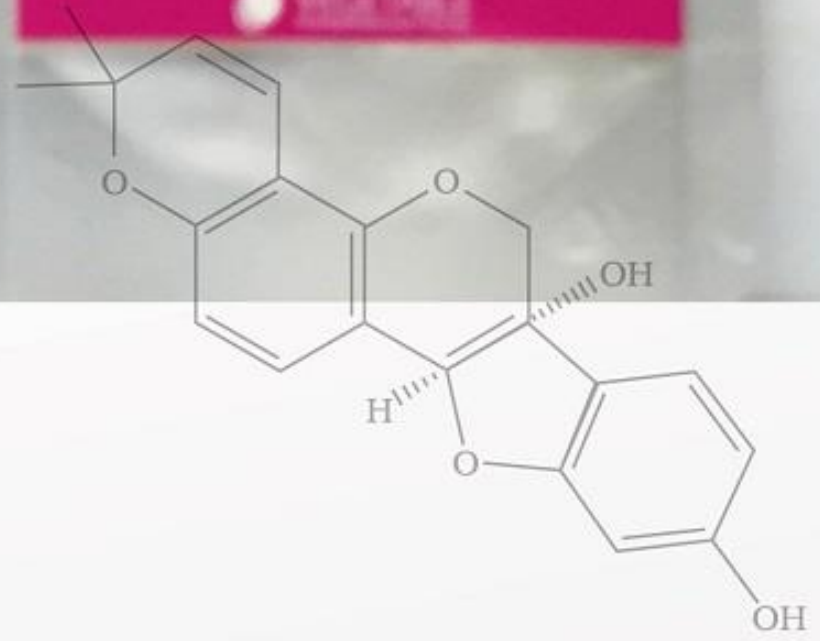
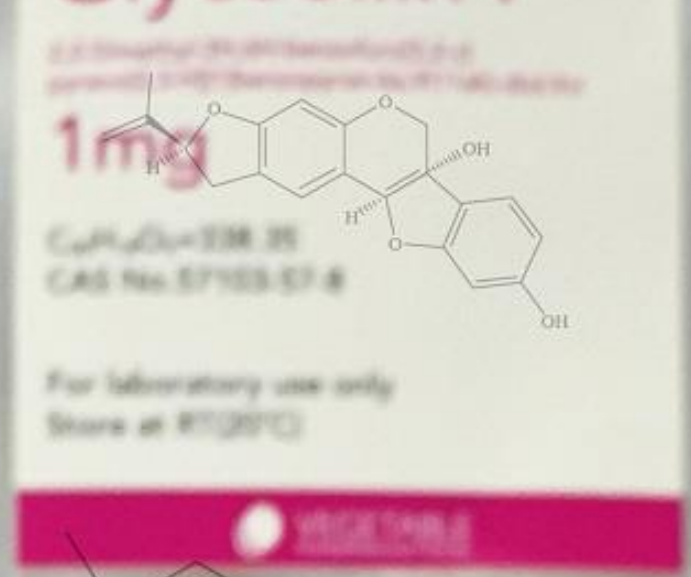
Name	Formula	Annotation Source: Predicted Compositions	Annotation Source: ChemSpider	Molecular Weight	RT [min]	Area (Max.)	KEGG Pathways	mcCloud Best Match	Group Area: Cont(Soy)	Group Area: NOT-Sen	Group Area: Sen	Group CV [%]: Cont(Soy)	Group CV [%]: NOT-Sen	Group CV [%]: Sen	Ratio:  Cont(Soy)  / ( NOT-Sen  +  Sen )	P-value:  Cont(Soy)  / ( NOT-Sen  +  Sen )	Ratio:  Cont(Soy)  / ( NOT-Sen  +  Sen )	P-value:  Cont(Soy)  / ( NOT-Sen  +  Sen )	略称	備考
Methionine	C5 H11 N O2 S	Full match	Full match	149.0511	3.288	1982076.975		93.7	128854.9	1662788.891	1372497.75	17.73106	13.07438	12.47223	0.077	0.825	5.86198E-14	0.029407227	Cont(Soy)	通常の豆群
L-Histidine	C6 H9 N3 O2	Full match	Full match	155.095	3.288	106.0313		88.1	91.97	1222222.222	202141	15	17.24033	11.61651	0.159	1.594	5.86198E-14	2.85422E-08	NOT-Sen	発芽大豆非感
3-Pyridylacetic acid	C7 H7 N O2	Full match	Full match	147.095	3.288	57.455		84.9	867	1604.84	104	37.6	7.626384	31.24018	3.313	2.187	8.94469E-08	0.000493813	Sen	発芽大豆感作
Valine	C5 H11 N O2	Full match	Full match	117.079	3.288	22219290		93.8	45.5	56638.8	478	29.398	4.00648	20.82092	0.044	1.252	5.86198E-14	0.214487708		
L-Glutamic acid	C5 H9 N O4	Full match	Full match	146.0532	3.276	14.5183		86.4	8.1	614.441	056	13.728	8.07426	38.89295	0.914	1.534	0.997641783	0.000548126		
$\alpha$ -Lactose	C12 H22 O11	Not the toy	Full match	342.062	3.283	14.168		91.3	034	196.160	932	18.135	5.00545	16.14066	27.982	3.675	5.86198E-14	5.86198E-14		
D-Raffinose	C18 H32 O16	Full match	Full match	360.091	3.288	6.3206		91.6	03.1	1.371	2600	17.0	14.06757	11.29265	19.021	1.062	5.86198E-14	0.839421258		
N6-Acetyl-L-lysine	C8 H16 N2 O3	Full match	Full match	176.1161	3.288	10189.271		93.7	13977	15	199217.5	14	5.469815	6.76538	0.09	1.277	5.86198E-14	2.58689E-09		
Adenosine 5'-monophosphate	C10 H14 N5 O7 P	Full match	Full match	347.0631	3.482	652207.43		95.6	566940.4	457039.5508	375682.866	10.35189	13.46582	16.57985	1.24	0.822	0.001204977	0.057783485		
4-Guanidinobutyric acid	C5 H11 N3 O2	Full match	Full match	145.0852	3.485	481761.05	Metabolic	85.2	426449.9	143049.3005	385546.722	16.24985	11.55537	6.077309	2.981	2.695	5.86198E-14	5.86198E-14		
Nicotinamide adenine dinucleotide (NAD+)	C21 H27 N7 O14 P2	Full match	Full match	663.1092	3.493	385502.7611		94.8	222094.3	117166.2742	347379.039	11.55206	14.50782	8.797519	1.896	2.965	9.82547E-14	5.86198E-14		
Cyclic ADP-ribose	C15 H21 N5 O13 P2	Not the toy	Full match	541.0614	3.495	46901.97052	Other	94.7	24853.84	12833.0439	37654.3018	11.82237	12.88612	11.51401	1.937	2.934	6.55032E-14	5.86198E-14		
Nicotinic acid adenine dinucleotide	C21 H26 N6 O15 P2	Full match	Full match	664.093	3.513	94871.81381	1 search results	93.5	66951.3	3368.961012	3907.67602	17.4	6.803196	6.173393	19.873	1.16	5.86198E-14	0.011068219		
Methionine sulfoxide	C5 H11 N O3 S	No match	Full match	151.046	3.513	105.11		93.5	12	2.1	3812	17	11.62423	0.195	0.759	5.86198E-14	0.00016334			
L-Glutathione (reduced)	C10 H17 N3 O6 S	Full match	Full match	307.033	3.513	236.008		94.8	97	21	363	113	8.026	6	1544	36.07843	0.915	52.045	0.313124703	5.86198E-14
Pyridoxal 5'-phosphate	C8 H10 N O6 P	Full match	Full match	244.046	3.513	947.186		83.3	95	35	65	79	28.22	9.042	9.479722	0.333	2.213	6.05072E-14	3.44191E-11	
DL-Stachydrine	C7 H13 N O2	Full match	Full match	149.0946	3.513	20.900		93.7	153	0.5	138	17	17.03068	0.052	3.344	5.86198E-14				
L-Pyroglutamic acid	C5 H7 N O3	Full match	Full match	129.0426	4.024	1320935		86.3	1199829	235451.6319	368092.052	10.60822	23.94251	15.96442	5.096	1.563	5.86198E-14			
Kojic acid	C6 H6 O4	Full match	Full match	142.0266	4.813	15095929.91		93.6	12874.41	13041.26316	13521142.6	132.4772	13.12605	10.09257	0.987	1036.797	0.0865			
Isoleucine	C6 H13 N O2	Full match	Full match	131.0947	4.946	126276155.6		97.5	5000920	104483564.9	95470788.9	10.95209	10.87401	7.916765	0.048	0.914	5.86198E-14			
4-Hydroxybenzaldehyde	C7 H6 O2	Full match	Full match	122.0368	5.093	1405478.205		81.1	159781	949192.0517	1236231.71	16.16255	8.329699	7.547803	0.168	1.302	5.86198E-14			
2-Hydroxyphenylalanine	C9 H11 N O3	Full match	Full match	181.074	5.122	9000576.768		91.4	929331.1	5881554.204	7665729.99	10.39036	8.498132	13.26004	0.158	1.303	5.86198E-14			
5-Adenosylhomocysteine	C14 H20 N6 O5 S	Full match	Full match	384.1217	5.145	107019.9425		91.4	99342.69	15653.932	18142.7677	12.50469	18.58688	22.10855	6.346	1.159	5.86198E-14			
L-Norleucine	C6 H13 N O2	Full match	Full match	131.0947	5.44	79040570.47		99.9	4679833	65035029.06	59679806	8.362066	9.498484	6.449096	0.072	0.918	5.86198E-14			
Kojic acid	C6 H6 O4	Full match	Full match	142.0266	5.691	9051633.447		85.9	15540.79	5709.654477	6939007.25	83.32403	61.81189	15.88568	2.722	1215.311	0.3			
Adenosine	C10 H13 N5 O4	Full match	Full match	267.0967	6.528	22776896.52		96.4	20274362	2463437.278	1845567.24	11.66238	15.59364	24.45796	8.23	0.749	5.86198E-14			
Guanine	C5 H5 N5 O	Full match	Full match	151.0494	7.429	609624.6413		86	501013.6	249479.6707	267976.532	12.093	14.06888	22.87601	2.008	1.074	5.00511E-14			
7-Methylguanine	C6 H7 N5 O	Full match	Full match	165.0651	9.294	64522.69848		82.4	57189.2	5208.443849	16760.6463	14.51905	24.17934	15.27543	10.98	3.218	5.86198E-14			
L-Phenylalanine	C9 H11 N O2	Full match	Full match	165.0791	9.393	185251068.4	Metabolic	97.6	4723849	171312403.1	174783756	27.16169	4.853224	4.473548	0.028	1.02	5.86198E-14	0.907325311		
Permethrin	C21 H20 Cl2 O3	No results	Full match	390.0799	9.826	265228.1687		87.8	14329.73	8002.81857	28023.5166	26.68923	21.71171	133.721	1.791	3.502	0.006491345	3.48233E-09		
Isovanillic acid	C8 H8 O4	Full match	Full match	168.0423	9.921	646652.7326		81.7	369321.6	323129.5758	589741.338	14.25642	13.50991	5.932443	1.143	1.825	0.015679921	2.67453E-13		



# Reagents for cancer research



Glyceollin I  
Glyceollin II  
Glyceollin III  
Glyceollin IV  
Glyceollin V  
Phenyliol  
8-Phenyldaidzin  
Phenyliol  
8-Phenyliol  
Phenyliol  
8-Phenyliol



## SCIENTIFIC REPORTS

### Endocrine therapy-resistant breast cancer model cells are inhibited by soybean glyceollin I through *Eleanor* non-coding RNA

#### Authors:

Tatsuro Yamamoto<sup>1, 6, #</sup>, Chiyomi Sakamoto<sup>1, #</sup>, Hiroaki Tachiwana<sup>2</sup>, Mitsuru Kumabe<sup>1</sup>, Toshiro Matsui<sup>3</sup>, Tadatoshi Yamashita<sup>4</sup>, Masatoshi Shinagawa<sup>5</sup>, Koji Ochiai<sup>5</sup>, Noriko Saitoh<sup>1,2\*</sup>, and Mitsuyoshi Nakao<sup>1\*</sup>

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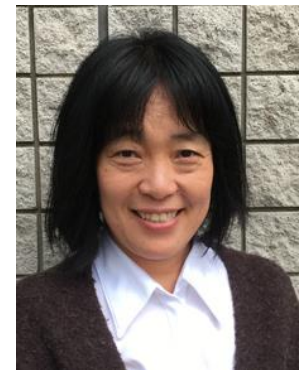
<sup>3</sup> Faculty of Agriculture, Graduate School of Kyushu University, 6-10-1 Hakozaeki, Higashi-ku, Fukuoka 812-8581, Japan

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<sup>6</sup> Department of Oral and Maxillofacial Surgery, Faculty of Life Sciences, Kumamoto University, Kumamoto, Japan

# These authors equally contributed to this work.





### Visualization Analysis of Glyceollin Production in Germinating Soybeans by Matrix-Assisted Laser Desorption/Ionization Mass Spectrometric Imaging Technique

Chizumi Abe, Ye Zhang, Kazuhiro Takao, Kuni Sasaki, Koji Ochiai, and Toshiro Matsui\*

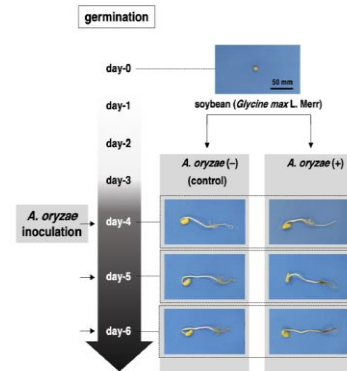


Figure 1. Protocol for *A. oryzae* inoculation in germinating soybean. The fungus, *A. oryzae* (0.05 g/g soybean), was inoculated on day 3 of the soybean germination.

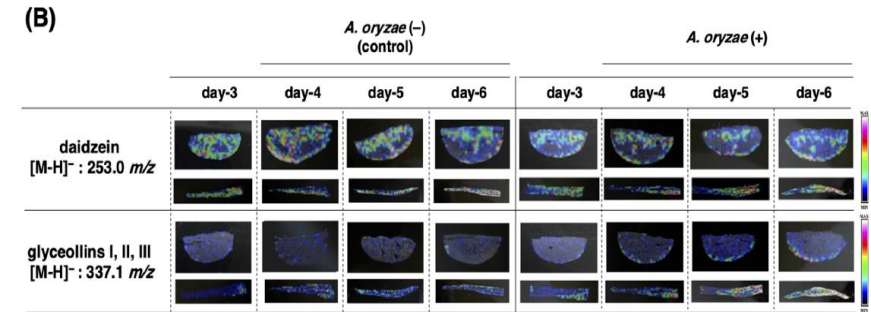
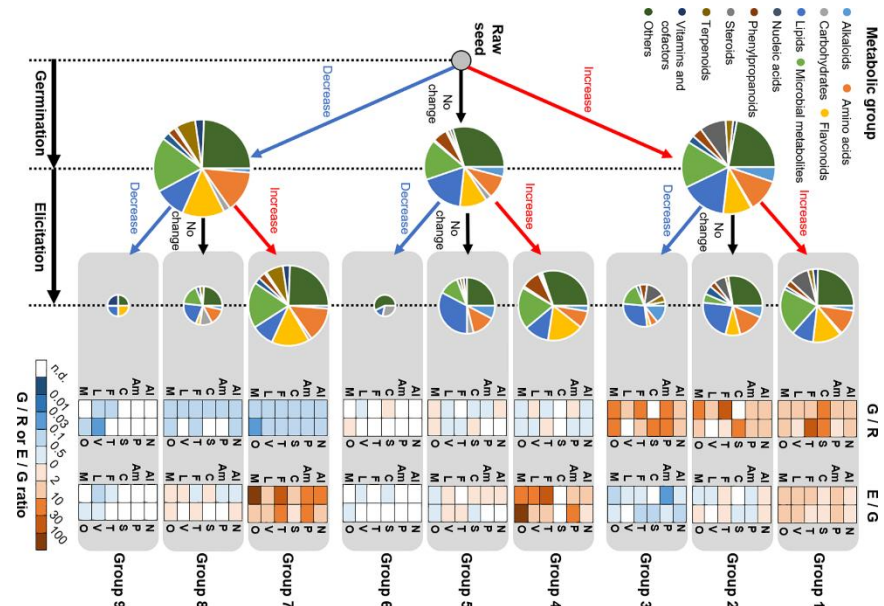


Figure 3. Visualization analysis of glyceollins in *A. oryzae*-inoculated soybean seed and root by the MALDI-MS imaging technique. (A) MALDI-MS imaging analysis of glyceollins I-III and their precursor, daidzein, in the middle part of the seed and root of soybean inoculated with or without *A. oryzae*. Daidzein ( $[M-H]^-$ , 253.0  $m/z$ ) and glyceollins I-III ( $[M-H]^-$ , 337.1  $m/z$ ) were visualized by MALDI-MS imaging in the negative ion-linear mode at a spatial resolution of 100  $\mu m$ . Further, 1,5-DAN (10 mg/mL, 70% ACN) was used as a matrix reagent. The intensity signals corresponding to the targets are shown as fixed pseudocolor scales.

### Metabolome analysis revealed that soybean-*Aspergillus oryzae* interaction induced dynamic metabolic and daidzein prenylation changes

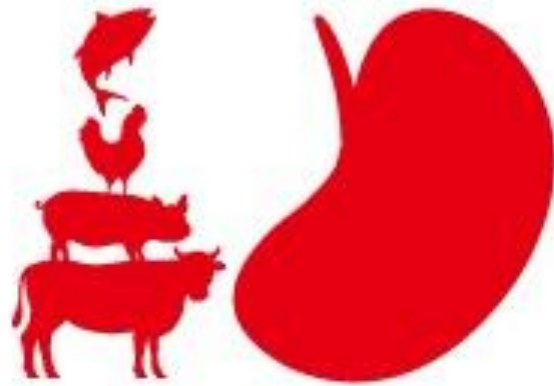
Haruya Takahashi<sup>1</sup>, Koji Ochiai<sup>2</sup>, Kuni Sasaki<sup>2</sup>, Atsushi Izumi<sup>2</sup>, Yu Shinyama<sup>2</sup>, Shinsuke Mohri<sup>1</sup>, Wataru Nomura<sup>1,3</sup>, Huei-Fen Jheng<sup>1,4</sup>, Teruo Kawada<sup>1,3</sup>, Kazuo Inoue<sup>1,3</sup>, Tsuyoshi Goto<sup>1,3\*</sup>





Cambridge Innovation Center | Kendall Square  
510 Kendall Street Cambridge, MA 02142





**MIRACLE MEAT**

# 1 Food Tech

O<sub>2</sub>

CO<sub>2</sub>

Temperature

Elicitation

Induce Phytoalexin

## 2 Drug Discovery



MIRACLE MEAT



DAIZ's Miracle Meat has been adopted for "THE GOOD BURGER", the second soybean patty series in Freshness Burger.



# The Zen

A&W 史上初  
大豆パティ!

※豚由来のゼラチンを使用しています



MIRACLE MEAT

## THE ZEN BURGER

ザ・ゼンバーガー  
¥440+税



MIRACLE MEAT

### New!

期間  
限定

## THE ZEN W BURGER

ザ・ゼンダブルバーガー ¥690+税

ザ・ゼンバーガー  
2万個  
突破記念!





# Meat section of Japan's major mass retailer "AEON"



お肉のようなうま味、香り、食感。発芽大豆からつくった「ミラクルミート」使用。まろやかな豆乳ソース入り。

エネルギー 222kcal 1個当たり

じつは、大豆からつくりました。

トップバリュ 大豆からつくったハンバーグ (豆乳クリーム入り) 200g (100g×2個)



大豆で食物繊維、たんぱく質。大豆100%。

ハンバーグ 384円 (本体価格) 414円 (税込)

大豆ハンバーグ 256円

濃厚デミグラスソース Rich Demi-glace Sauce 148円 (本体価格) 159円 (税込)



濃厚デミグラス Rich Demi-glace Sauce

濃厚デミグラス Rich Demi-glace Sauce



じつは、大豆です。大豆100%



DAIZ MIRACLE MEAT

今話題の「植物肉」ミラクルミートを使用!!

ギョーザ1皿ご注文で **今だけ!!** 「ミラクルミートの餃子」 1個付いてくる!

\*ギョーザを含むセットメニューのご注文でも、「ミラクルミートのギョーザ」1個付いてきます。

**ミラクルミートってなに?**

ミラクルミートとは、「大豆ミート」の一種です。通常使われる豆の状態の「穀物の大豆」ではなく、芽を出して「植物になった期間の大豆」を使用しています。通常の大豆ミートと違いアミノ酸・ビタミン・ミネラルがとっても豊富で栄養豊富! さらに、旨味に関するアミノ酸が牛肉よりも高く、お肉さながらの食感も再現されています。

**「まるで本物のお肉!」をお試し下さい!**

どれが **ミラクルミートの餃子** が

320円 1個

**分かるかな??**



## 【Alternative protein】

- Reduction of Off-flavor
- Reproduction of meat-like texture

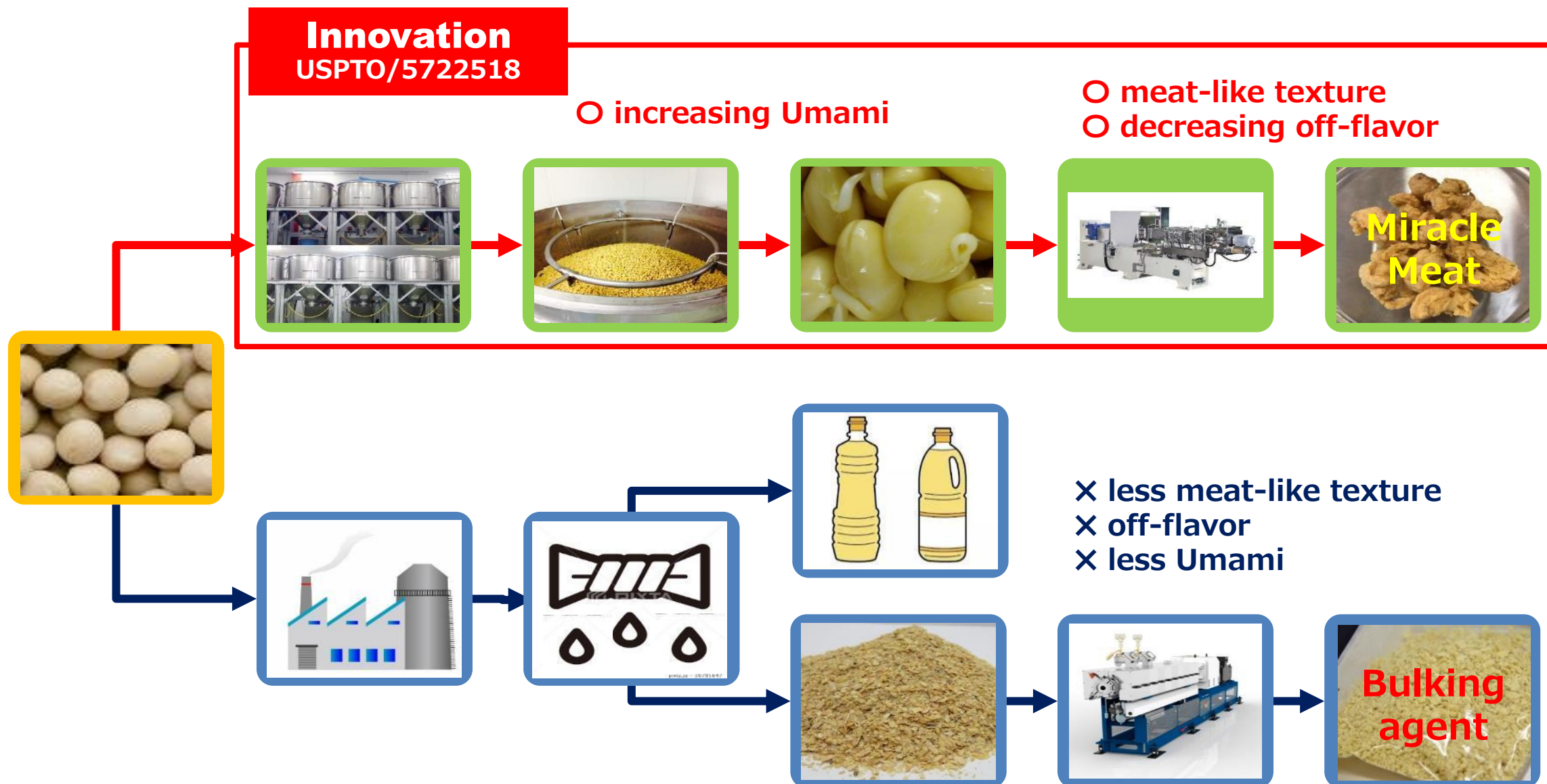


**What is Miracle-meat<sup>®</sup> ?**

**Neither oil pomace  
nor starch pomace**

**How do we make  
Miracle meat  ?**

# Soy-Oil Pomace VS Miracle meat



# Look at beef and soy cells

**Animal cells**  
**Beef, Pork, Chicken**

Protein 16%

Carbohydrate 0.3%

Lipid 12%

**Plant cell**  
**Ochiai-stayle germinated soy**

Protein 18%

Carbohydrate 3%

Lipid 9%



*animal cell*



*plant cell*



# Mechanism



**Innovation**  
USPTO/5722518

**Crop**  
【Sleeping】

<b>Umami</b>	<b>Rare</b>
<b>Vitamin</b>	<b>less</b>
<b>Nutrition</b>	<b>Primary nutrition</b>
<b>Absorbency</b>	<b>Difficult</b>

**Plant**  
【Active】

<b>Umami</b>	<b>Amino acids increased to the same as meat</b>
<b>Vitamin</b>	<b>Increase in 13 hours</b>
<b>Nutrition</b>	<b>Induced secondary Metabolites</b>
<b>Absorbency</b>	<b>Easy</b>

# OGM/Ochiai Germination Method

Low  
 $O_2$

High  
Temp



High  
 $CO_2$

Moisture  
Control



発芽制御タンク1号機

発芽制御タンク2号機

発芽制御タンク3号機

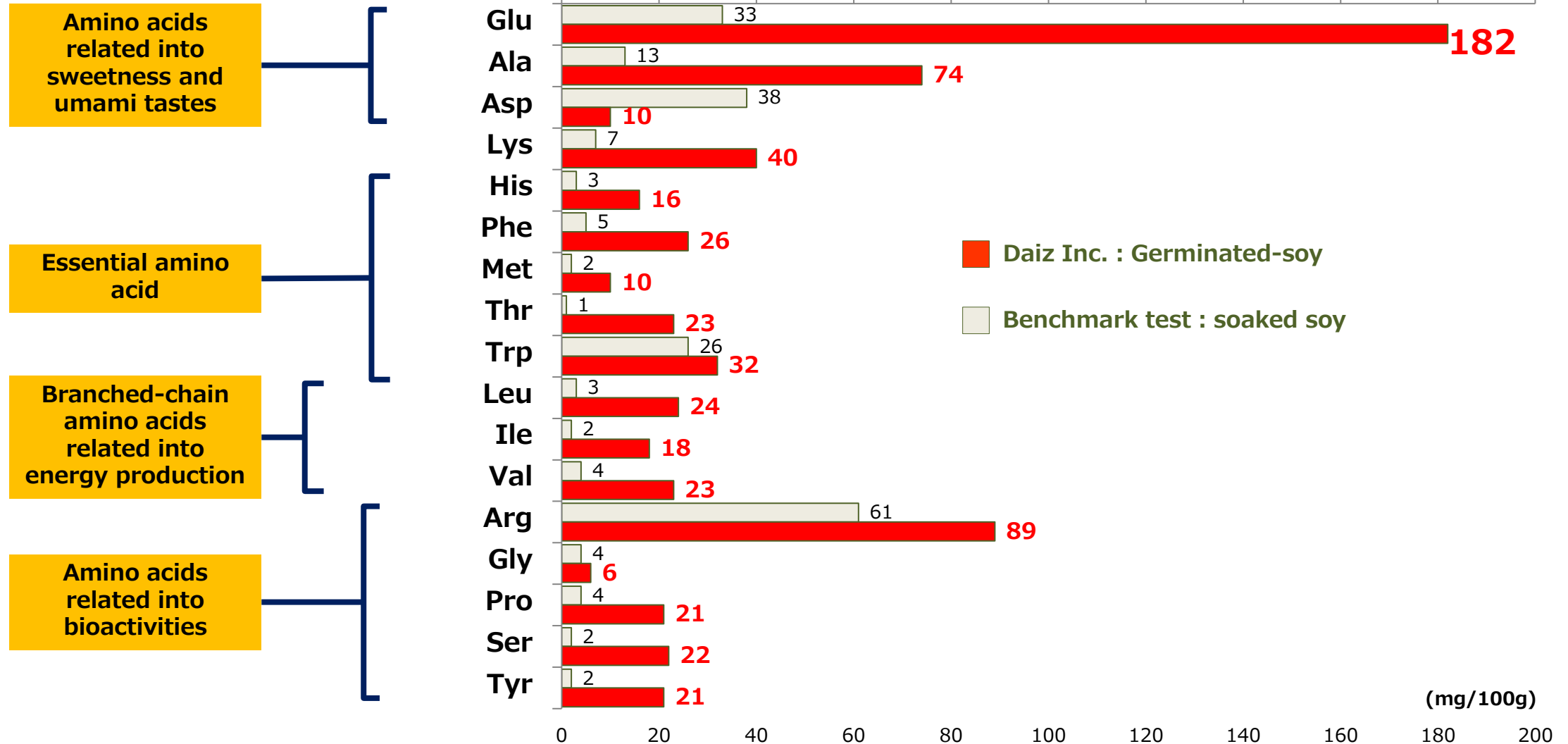
発芽制御タンク4号機

発芽制御タンク5号機

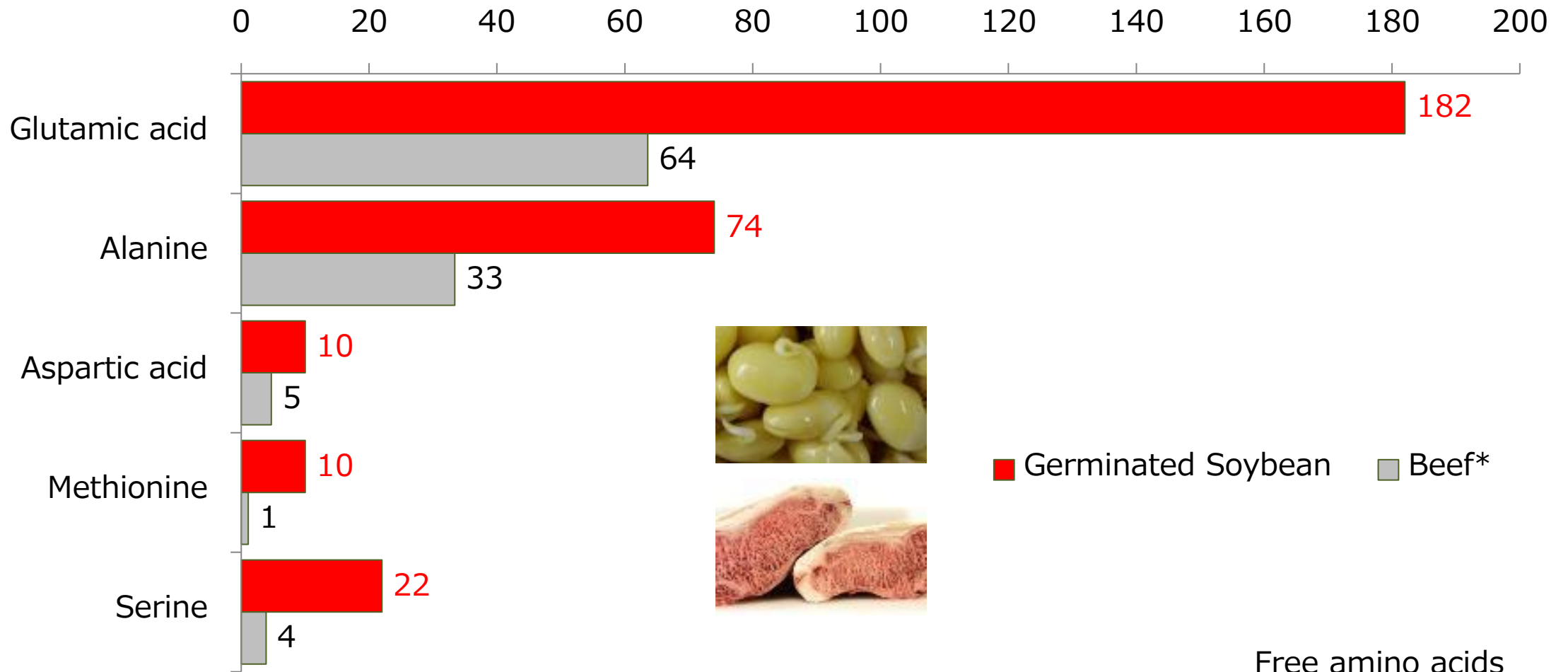
**Pain**

**UMAMI**

# "Ochiai style germination method" is inducing Free amino acid (mg) in 100 g of soybean seed



# Comparison of free amino acids related to taste (umami, sweetness)



\*Reference: Research result information (2006-2007) of Kyushu Okinawa Agricultural Research Center, NARO.

[http://www.naro.affrc.go.jp/org/karc/seika/kyushu\\_seika/2007/2007119.html](http://www.naro.affrc.go.jp/org/karc/seika/kyushu_seika/2007/2007119.html)

Free amino acids (mg/100g)

**Pain**

**No off-flavor**

# Breeding of soybean rich in oleic acid by using a non-GMO technology.



Toyoaki ANAI/ Professor  
Faculty of Agriculture,  
Saga University

## Purposes

- Development of oil seed without trans fatty acids.
- non-GMO soybean rich in oleic acid

- Canada production  
High oleic acid  
『HO Canada』

Variety registration Done  
Start on 2019



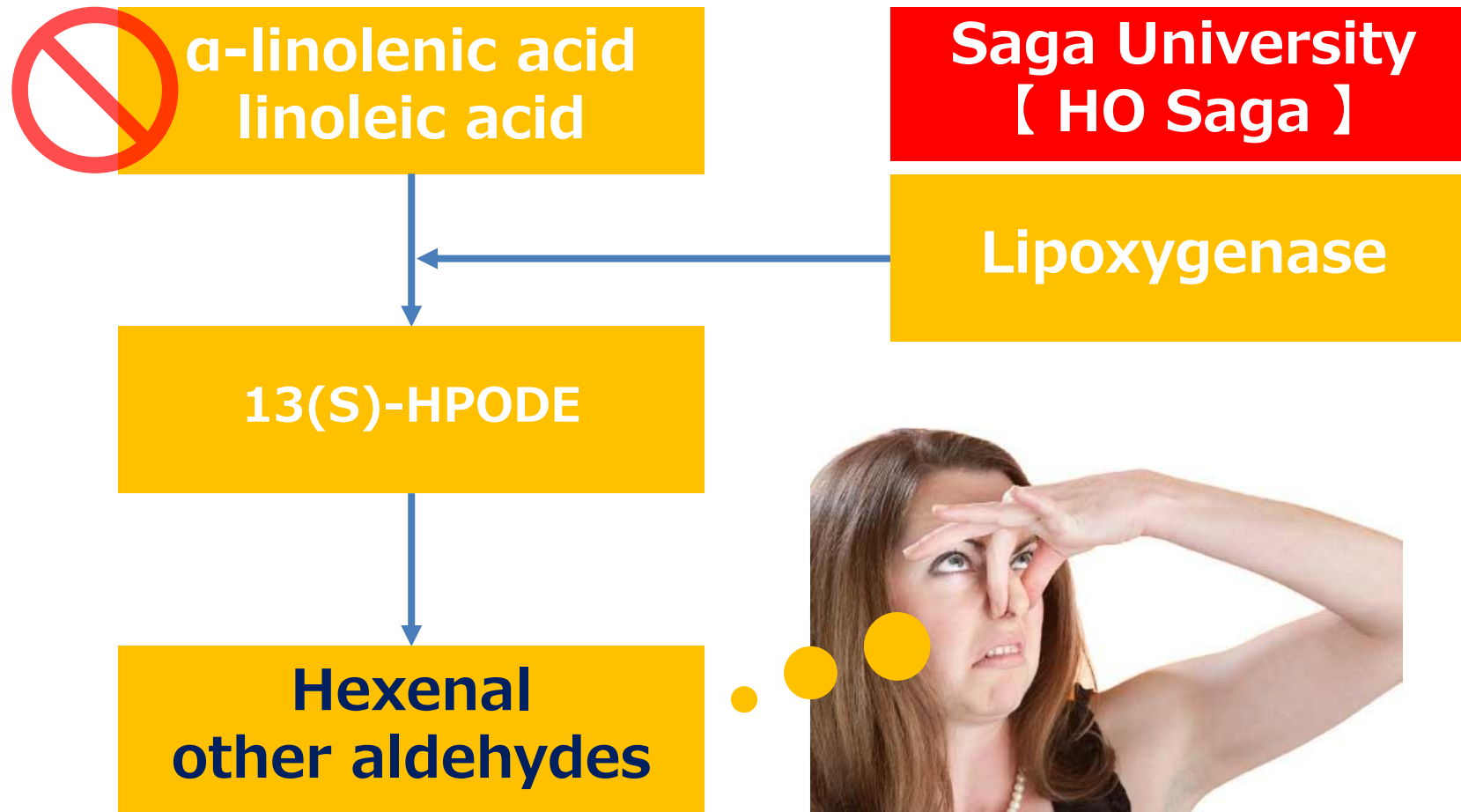
- Saga production  
High oleic acid  
『HO Saga』

Variety registration Done  
Start on 2020





# $\alpha$ -linolenic acid and linoleic acid are precursors of beany flavor



**Pain**

**Meat-like texture**

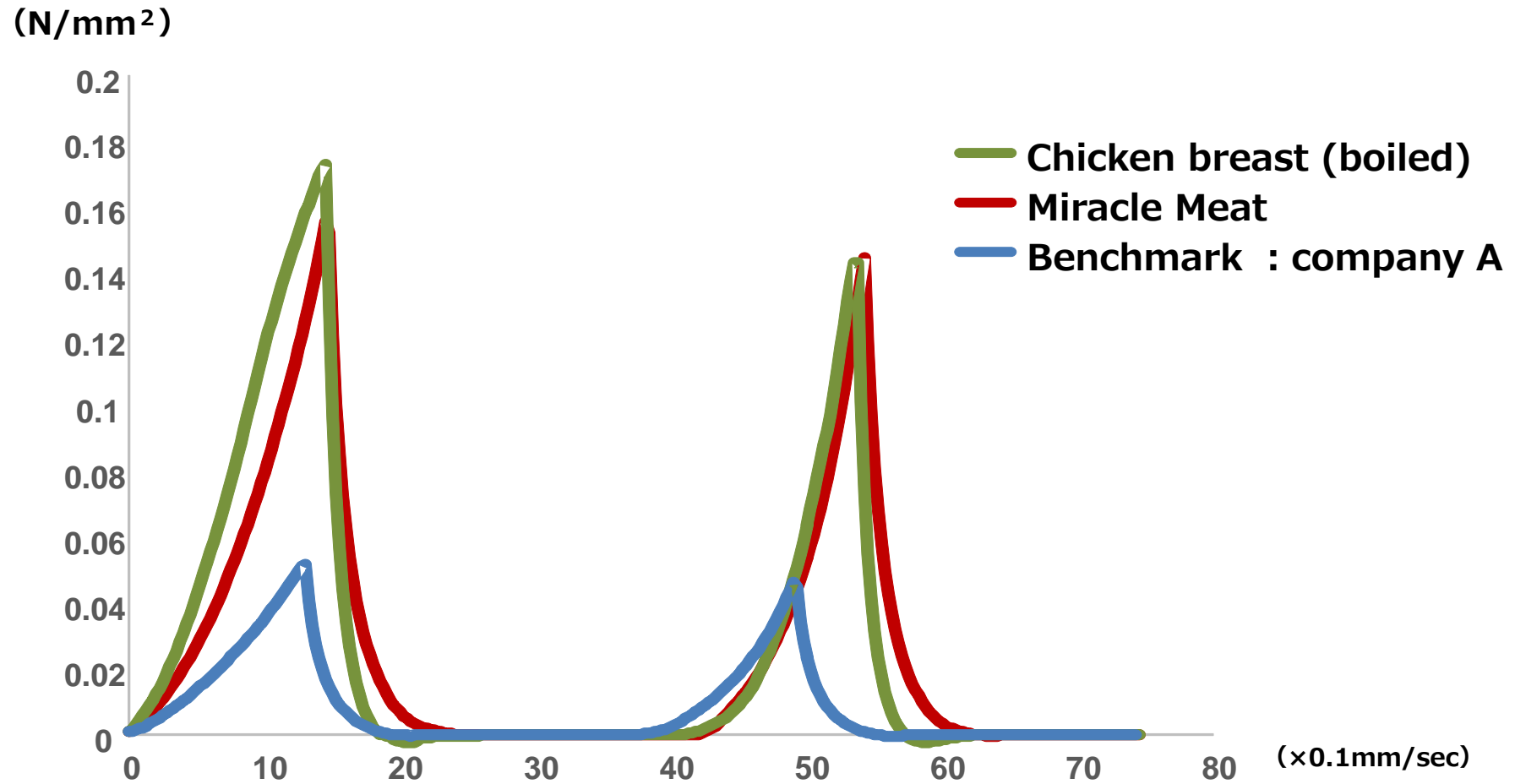


**Production capacity  
4,000MT/Year**

# Sliced meat development / new strategic item



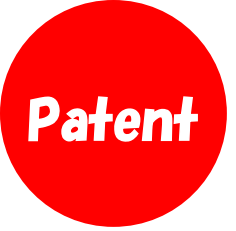
# Improved texture



In-house analysis 2020.12.18

Comparison of stress per area = elasticity

Rheometer manufactured by Yamaden Co., Ltd. (Model: RE2-33005B)



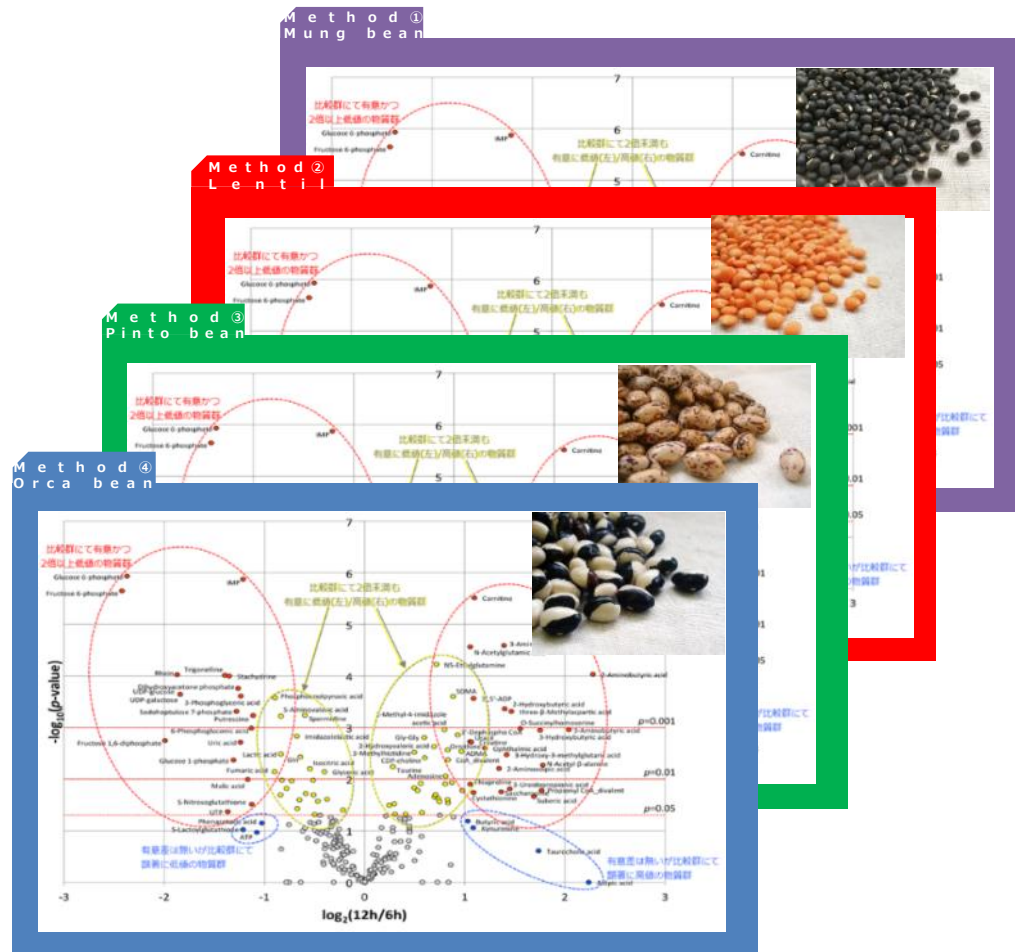
# OGM R&D



# The Future of MIRACLE MEAT

## Reproduce the taste as close to meat as possible

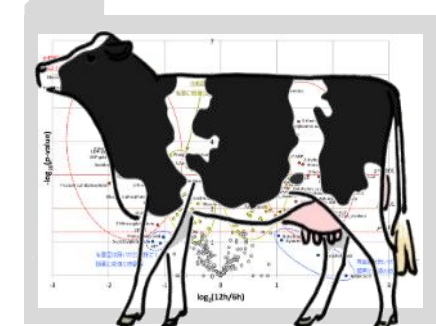
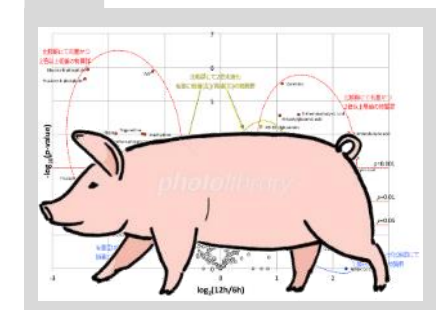
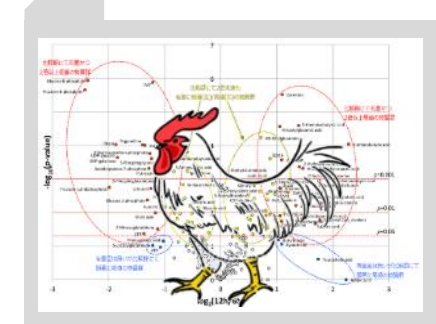
- We perform germination and metabolome analysis of beans and grains.
- With the help of AI, factors related to taste and texture are characterized.



Combination like-chicken  
taste

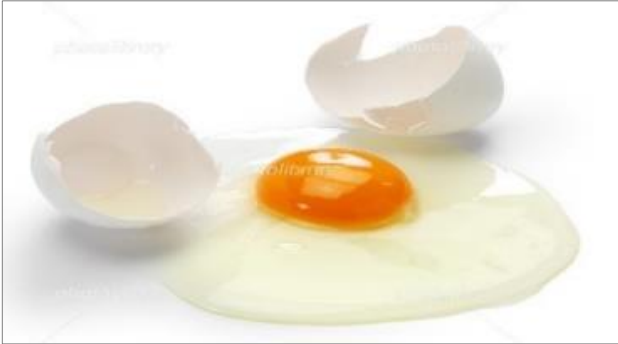
Combination like-pork  
taste

Combination like-beef  
taste





# Application of food tech using OGM



## 1. Plant-based egg



## 2. Plant dairy products



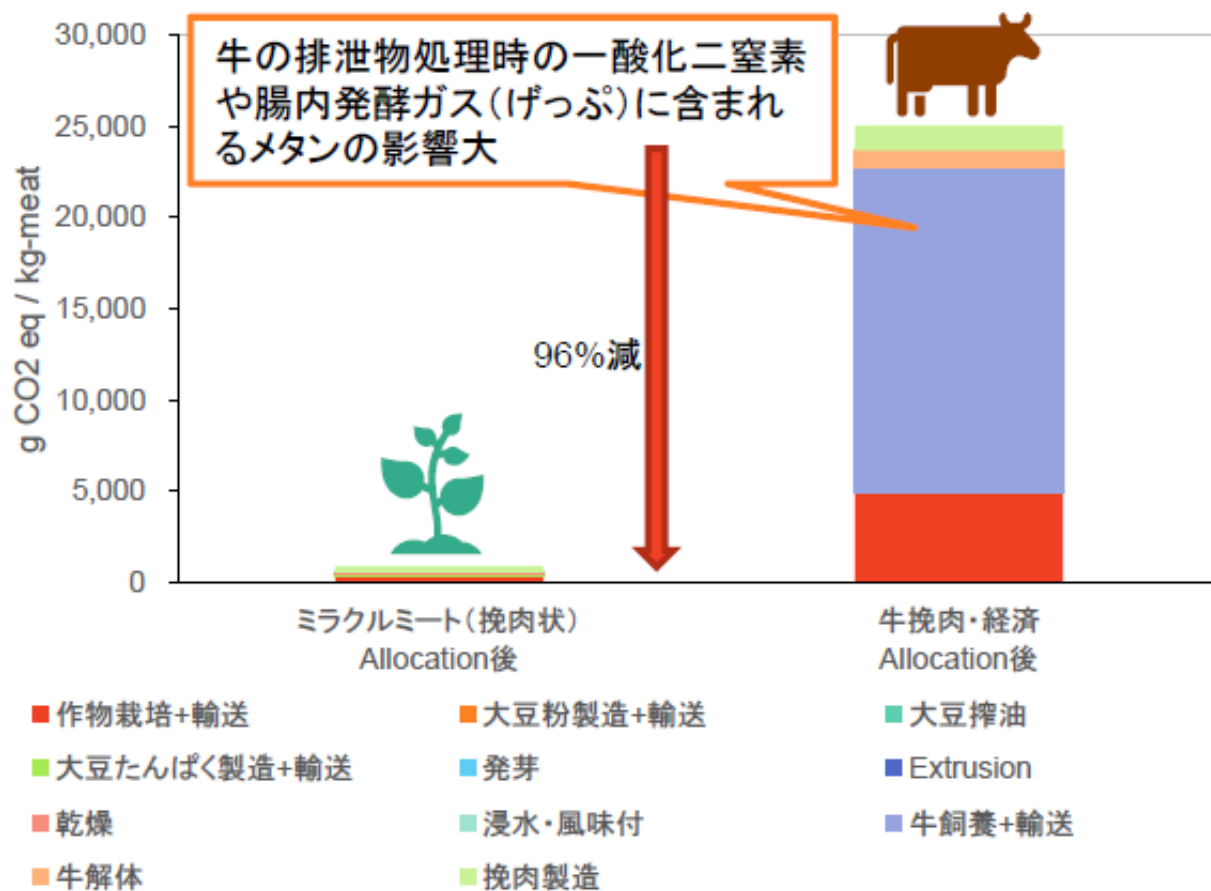
## 3. Fish bait



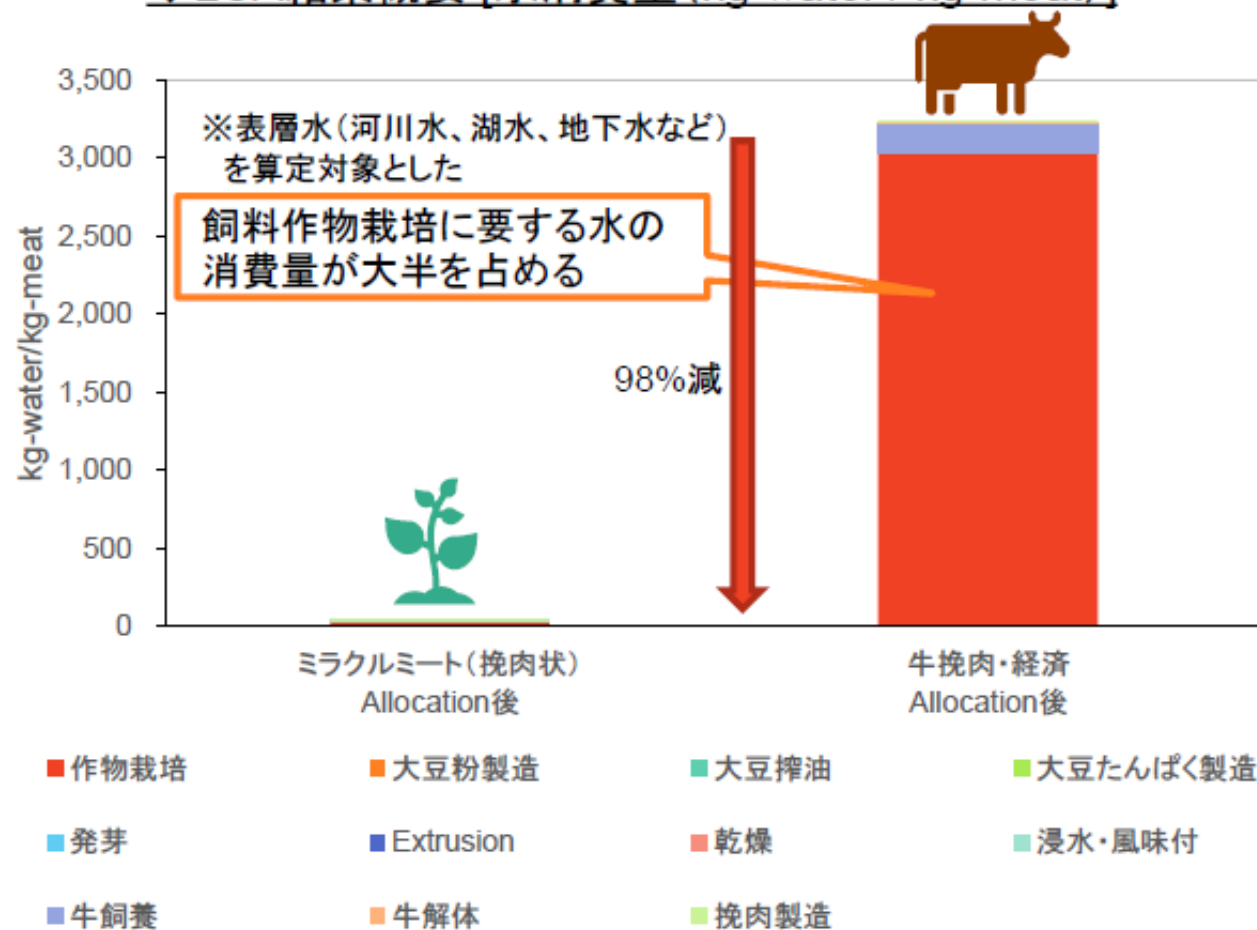
# Our SDGs / Life Cycle Assessment

丸紅株式会社 経済研究所産業調査チームによるLCA評価

◆LCA結果概要 [GHG排出量(g-CO<sub>2</sub>eq / kg-meat)]



◆LCA結果概要 [水消費量(kg-water / kg-meat)]



A large, cracked, golden egg is the central focus of the image. The egg is positioned vertically and has a textured, metallic gold surface. It shows signs of being broken, with several cracks and a small hole at the top. The egg is set against a plain white background. Overlaid on the egg is the text "Thank You" in a large, bold, blue font, and below it, the URL "https://www.daiz.inc" in a smaller, bold, blue font.

**Thank You**  
**<https://www.daiz.inc>**

