Eat Well, Live Well.
AJINOMOTO®

Briefing on Various ESG-related Initiatives by Ajinomoto Group

-Workshop on “Umami” and MSG-

March 24, 2016

Hiromichi Ono

Member of the Board &
Corporate Vice President
Ajinomoto Co., Inc.

Review of 1st ESG Meeting

Eat Well, Live Well.
AJINOMOTO

Overview

Time and date: March 27, 2015 (Fri)15:30 - 17:00
Venue: Ajinomoto Co., Inc.
Participants: 30 Japanese institutional investors, and 5 others
Title: Briefing on Various ESG-related Initiatives
Contents: 1. FY2014-2016 medium-term management plan, medium to long-term vision and ESG
2. Environment (E): Sustained value creation through bio-cycle and amino acid technology
3. Society (S): Sustained value creation using value chain and human resources
4. Governance (G): Evolution of the management foundation

Key questions

- Difficult to evaluate ESG because quantitative data is limited. If environmental data of 10 years in chronological order is disclosed, we can see that added value of the production process is increasing.
- What is the view on the social issues regarding diet in developed countries? These countries also face poverty issues, and the company may be able to help with solutions.
- Can't the U.S.'s nutrition issue be solved through dietary education? Unmarried couples have exceeded 40% and mental and physical growth of children appear to be unstable including meals.
- When briefing overseas investors, there are always questions about the security of MSG. What measures do you take to overcome that?

Changes to UN SDGs, COP21 and other Int'l Frameworks

- Targeting **everyone, everywhere**
- **Improved nutrition** specified for the first time

No POVERTY

End poverty in all its form, everywhere

<SDGs> Common goals for 2030 for the international community adopted at the UN Summit on Sep 25, 2015. The earlier millennium goals (MDGs) were primarily aimed at developing countries (poor class)

ZERO HUNGER

End hunger, achieve improved nutrition and promote sustainable agriculture

GOOD HEALTH AND WELL-BEING

Ensure healthy lives for all people of all ages

RESPONSIBLE CONSUMPTION AND PRODUCTION

Halving per capita food waste (reducing food loss) worldwide at the retailer and consumer levels

LIFE BELOW WATER

Total of 17 fields related to food and health

Challenge of Nutrition and Food Resources Faced by Japan

◇ **Double Burden Malnutrition**
Simultaneous progress of over nutrition and protein malnutrition

Metabolic syndrome: over nutrition in middle and old age (unbalanced diet and nutrient intake)
Locomotive syndrome: under nutrition in old age (especially lack of proteins)
Lean young women: under nutrition of young women (also affects the newborn child)

◇ **Increase in developed country poor class due to widening income disparity**
(6th worst among developed countries, 16% of population)
- Increase in children who cannot eat due to economic reasons

◇ **Depletion risk of food resources led by grains and huge food waste**

◇ **Shortage of employees in food-related industry following reduced working population and relative decline in working conditions**

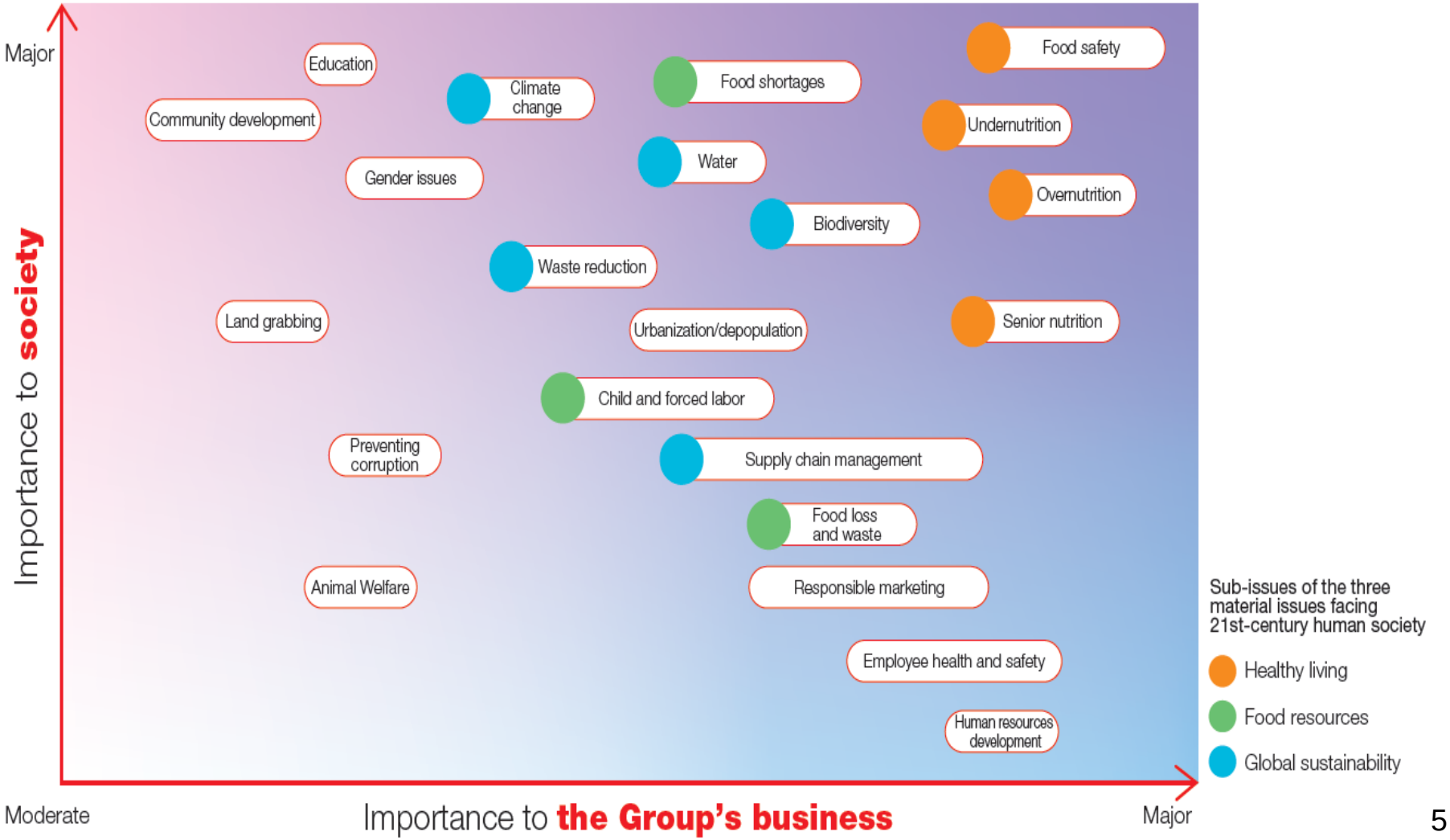
◇ **Concentration on megacities and stagnation of regional industries**

Take on the social challenges of nutrition and food resources

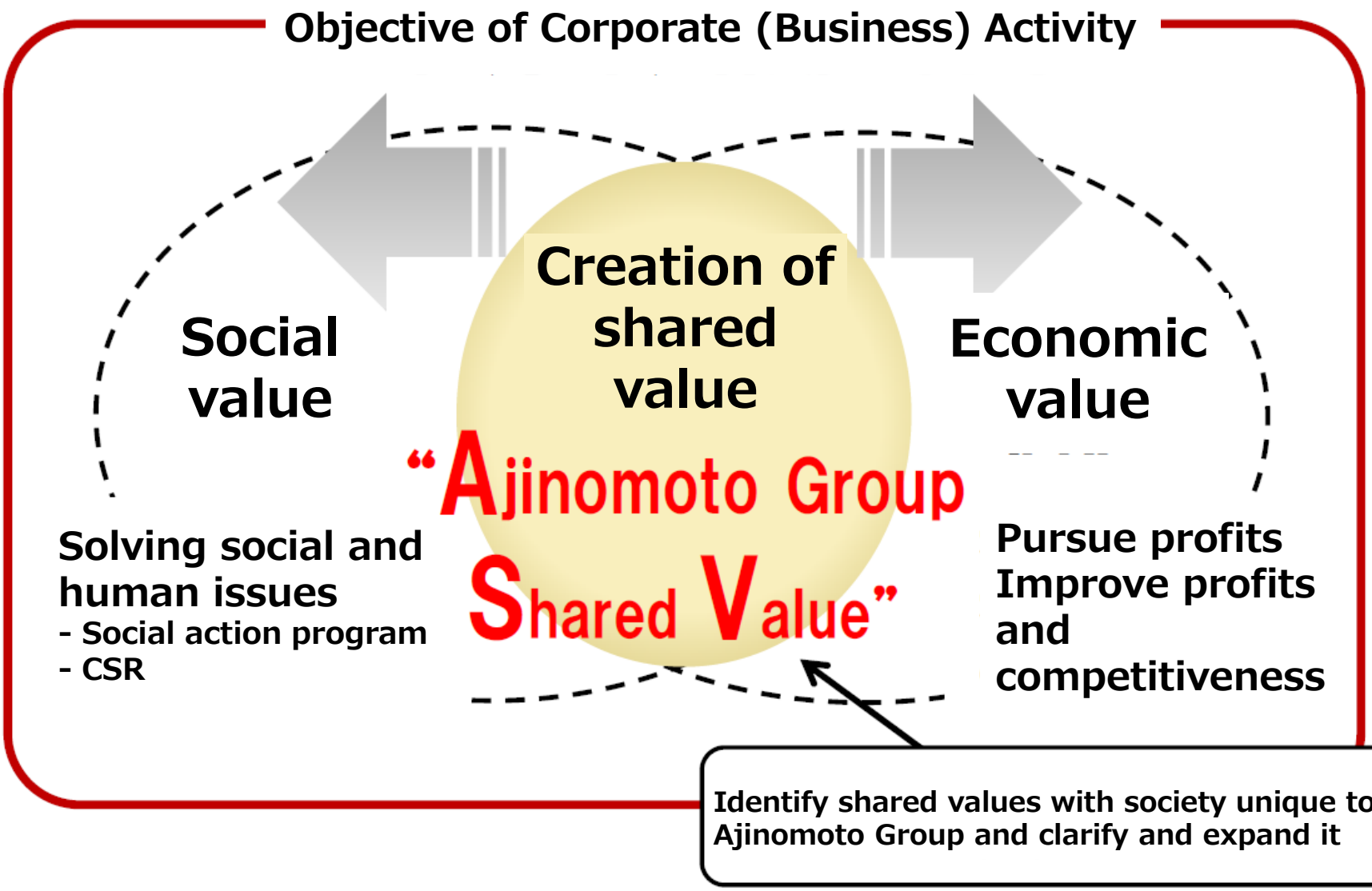
Ajinomoto Group's Materiality

Mapping of materiality items studied and identified by Ajinomoto Group

Items that are deeply linked to the issues faced by 21st century mankind



ASV (Ajinomoto Group Shared Value) Overview



Business Initiatives to Tackle Nutrition and Food Resource Issues

Issues		***Specialty*** to be used	What Ajinomoto Group can do/output
Nutrition	Metabolic syndrome in middle and old age Locomotive syndrome in old age Malnutrition in women and children	Tasty, nutritionally balanced, simple - reduce salt - reduce carbohydrate - consume protein - consume vegetables - less economic burden Ability to develop technology, product and menu that support dietary lifestyle	- Reduce salt but maintain taste by leveraging dashi and umami*:* low salt *HONDASHI®, YASASHIO®*, etc. - Reduce sugar but maintain sweetness: *PAL SWEET®* - Lots of vegetables, deliciously: *Nabe Cube®*, *Cook Do®* Koumi Paste *, Ajinomoto KK Consomme* - Reasonably complement proteins: *Amino Aile®*, *Aminocare® Jelly Leucine 40*, *amino VITAL®*, etc.
Food waste		Improve water-holding capacity of rice = use of material that would maintain fluffiness	- *Ajinomoto KK Okome Fukkura Choriryo*(Seasoning to make rice fluffy)
		Technique to fully use up raw materials	- *HONDASHI®* that fully utilizes bonito - *Knorr® Cup Soup*, etc. that fully utilizes corn
		Menu development knowledge (expertise on fully using up food materials and heat saving)	- *Ecouma Recipe®* introduction
Shortage of food resources		Technology to effectively use the by-product of amino acid fermentation	- Use the by-product of amino acid fermentation in fertilizer: *AMIHEART®*
		Knowledge of bonito	- Study the ecology of bonito, which is the main ingredient of *HONDASHI®*

Strengthening Corporate Governance

Human resources, rules and organization – the three-prong reform

One's own career path design = create opportunity for self realization

Promotion of diversity

April 2016 onwards

<Human resources>
Revise the personnel system of core positions
*Right person for the right job (talent management) upon clarifying job responsibilities required at each workplace (position management)

<Organization>
Establishment of global corporate in the Global HQ

<Rule>
Adoption of Global Governance Policy (GGP) across the entire group

1. Rule: Clarify responsibilities, rights of each business and group company in GGP
   Increase speed from strategy proposals to decision making
2. Organization: Build platform of "a headquarters that leads"
3. Human resources: To a system that appoints the right person for the right job, effective for promoting diversity

Establishment of Global Corporate

Global Corporate established by Global HQ

Aims

- Enhance corporate brand appeal
- Promote diversity
- Strengthen professional service

Planned target functions
(red letters: new)

Global human resource management, global communications, corporate planning, finance, legal affairs, intellectual property, research and development planning, information planning, etc.

- Global business strategy and planning, and corporate management (support for top management and some professional service functions)
- Reorganize global functions of the Ajinomoto Co., Inc. headquarters and clarify roles from the perspective of global group management
- Plan to carry out the second phase of reorganization in April 2017

Toward the correct understanding of umami and MSG

March 24, 2016

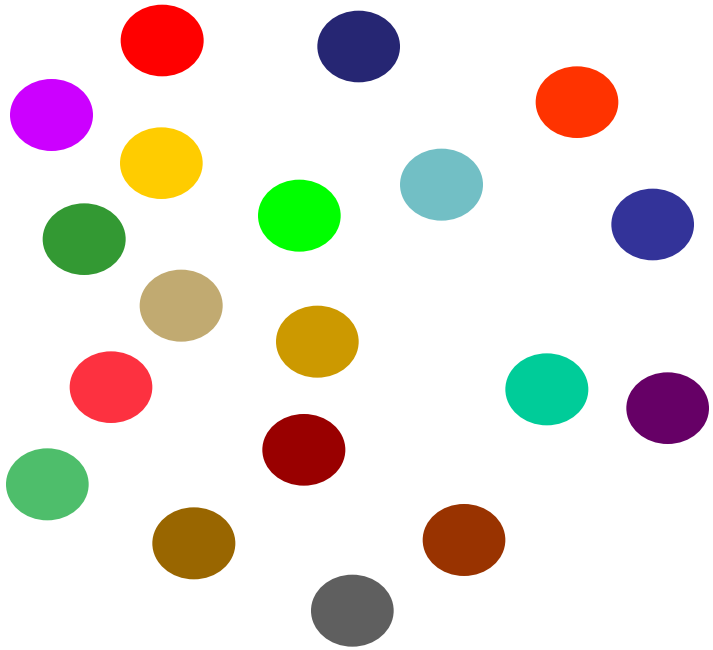
Kumiko Ninomiya, Ph. D.

Ajinomoto Co., Inc.
Corporate Fellow
Global Umami Communications

Amino acids in various foods

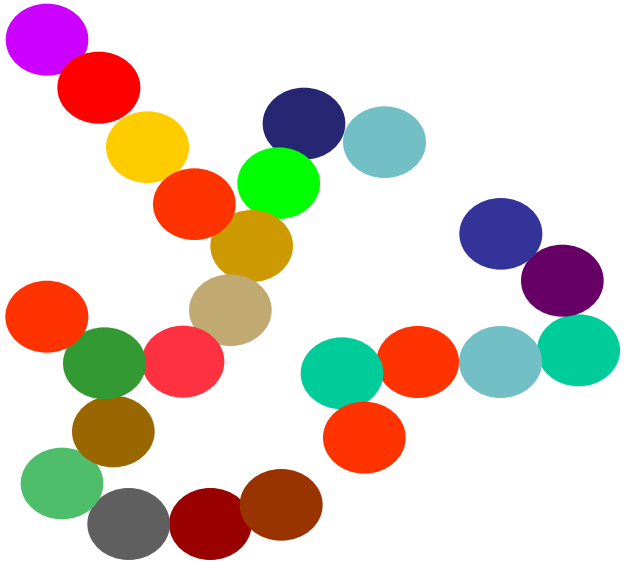
Amino Acids and Protein

Taste



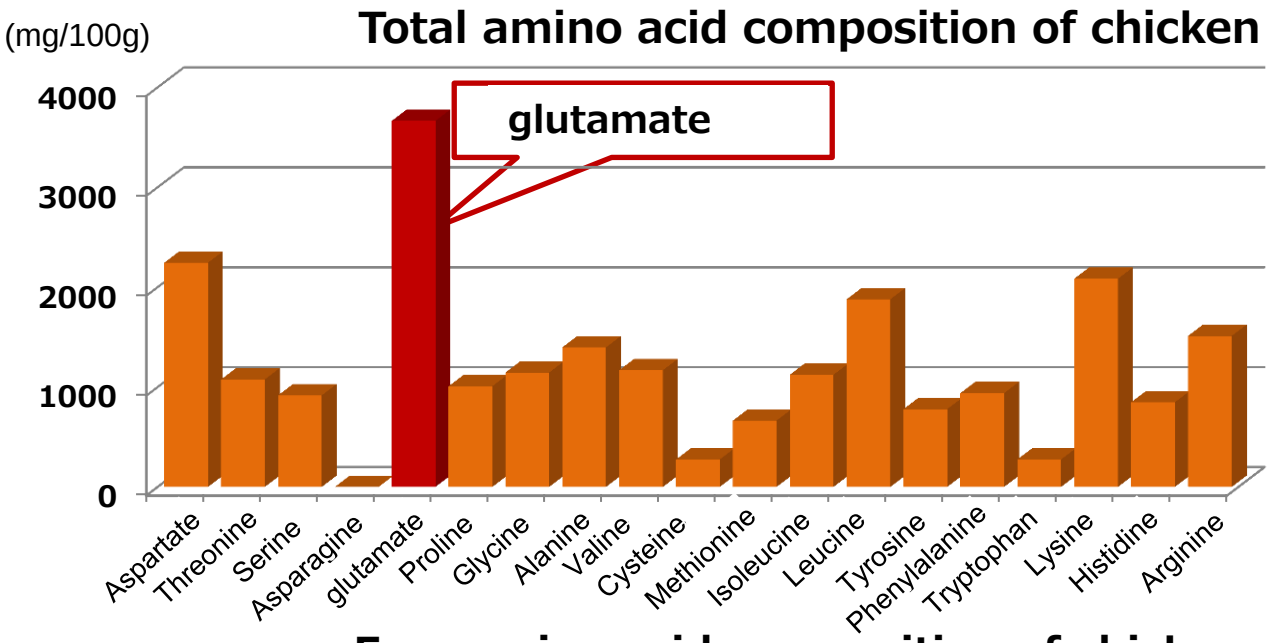
Free amino acids

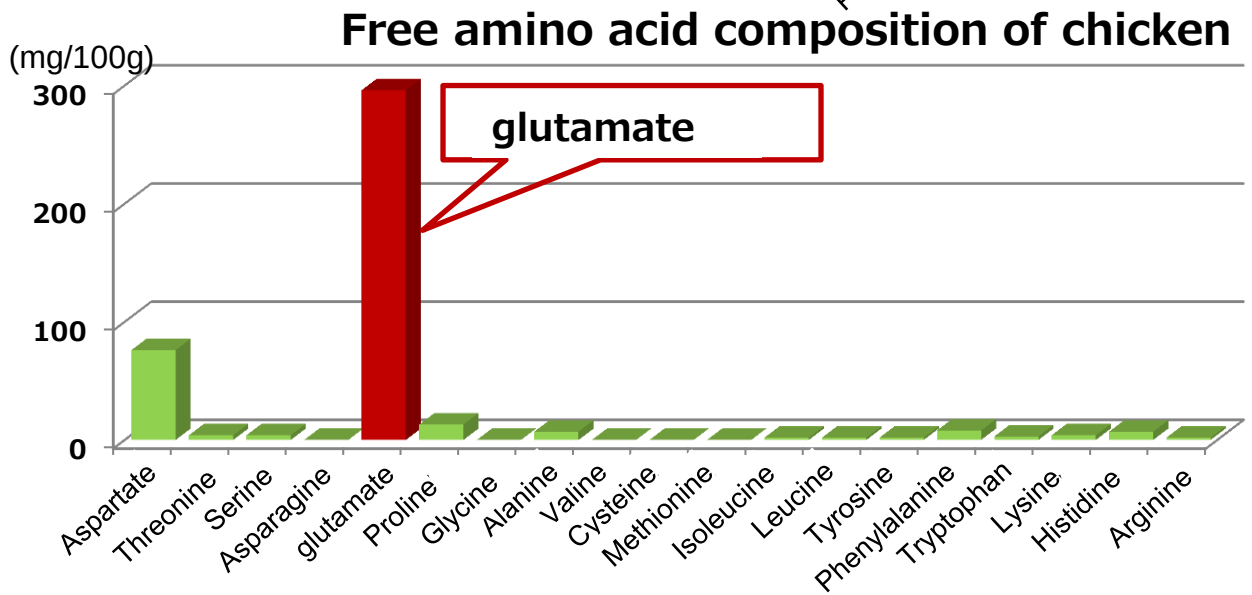
Tasteless



Protein

Total and free amino acids in chicken



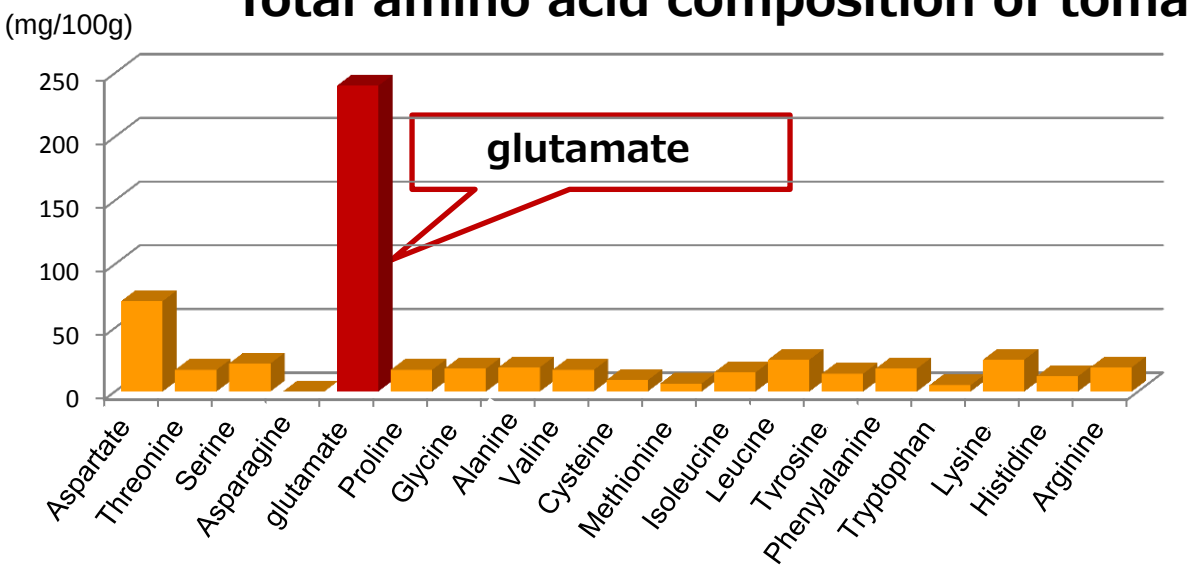


Water 70.8g/100g
Protein 19.4g/100g

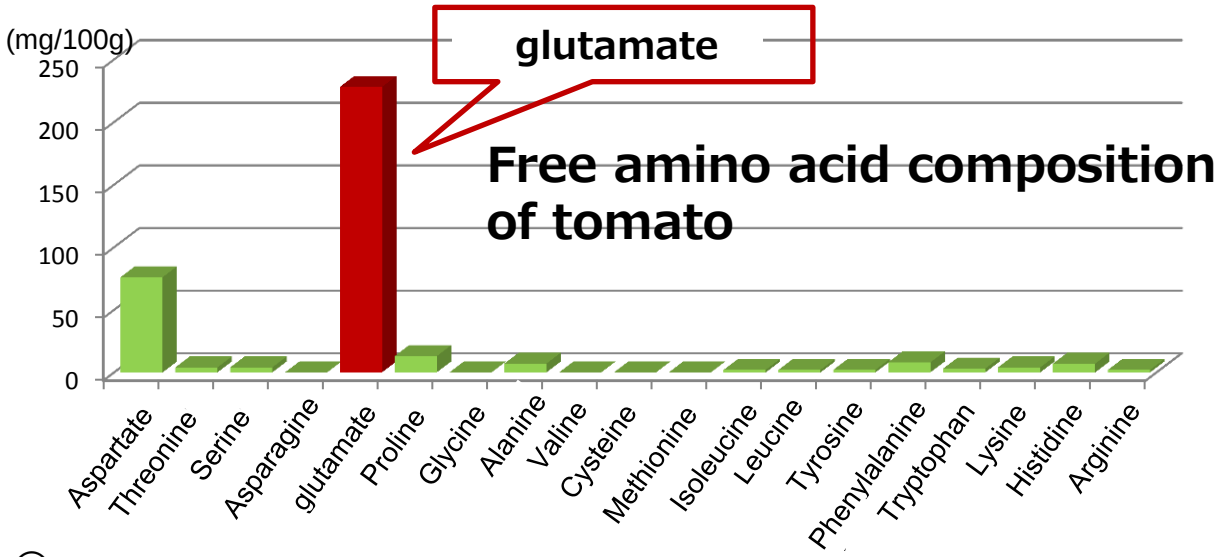
(Kagawa Education Institute of Nutrition (2015), K. Ninomiya (1998))

Total and free amino acids in tomatoes

Total amino acid composition of tomato



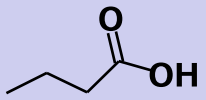
Water	94.0g/100g
Protein	0.7g/100g



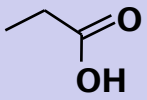
(Kagawa Education Institute of Nutrition 2011, K. Ninomiya (1998))

Taste of free amino acids

Umami



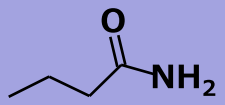
Glutamate



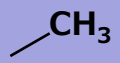
Aspartate

Sweet

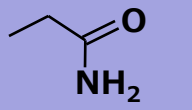
Glycine



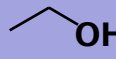
Glutamine



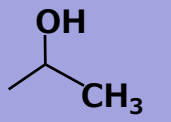
Alanine



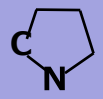
Asparagine



Serine

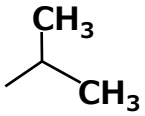


Threonine

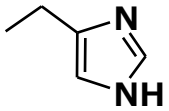


Proline

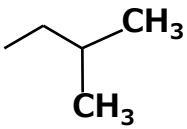
Bitter



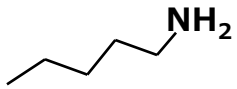
Valine



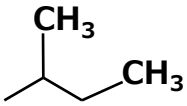
Histidine



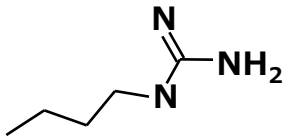
Leucine



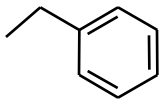
Lysine



Isoleucine

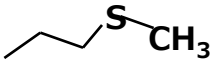


Arginine

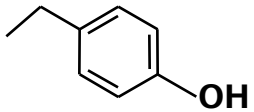


Phenylalanine

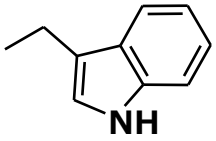
Cysteine



Methionine



Tyrosine



Tryptophan

Glutamate: the most abundant amino acids in the nature

Why is glutamate so abundant in the nature?
(Vernon R. Young and Alfred M. Ajami, 2000)

Glutamate's function

- Constituent of protein
  (20-40% of protein is glutamate)
- Taste component in foods
- Send signal on from tongue and to brain for protein digestion.
- Energy source for intestine.

New findings after 2000

- Glutamate receptors in the stomach.
- Promote salivation from small salivary gland.
- Promote digestive juice secretion.
- Taste of glutamate (umami) may act to both enhance flavor and promote a feeling of satiety.

Discovery of umami

Kikunae Ikeda

Major taste components in Japanese soup stock ‘konbu dashi’	
Glutamate	56mg/100ml
Aspartate	50mg/100ml
Mannitol	1 g/100ml
Sodium	49mg/100ml
Potassium	54mg/100ml

(K. Ninomiya, 2010)

An attentive taster will find out something common in the complicated taste of asparagus, tomato, cheese and meat, which is quite peculiar and can not be classed under any of the four basic tastes.

(Presentation by Prof. Ikeda in the Int’l Congress of Applied Chemistry in 1912)

Discovery by Prof. Ikeda

1. Japanese soup stock ‘konbu dashi’ contains glutamate.

2. Proposed ‘umami’ for the taste quality of glutamate.

(Kikunae Ikeda, *New Seasonings*, *The Chemical Society of Japan Journal*, 1909)

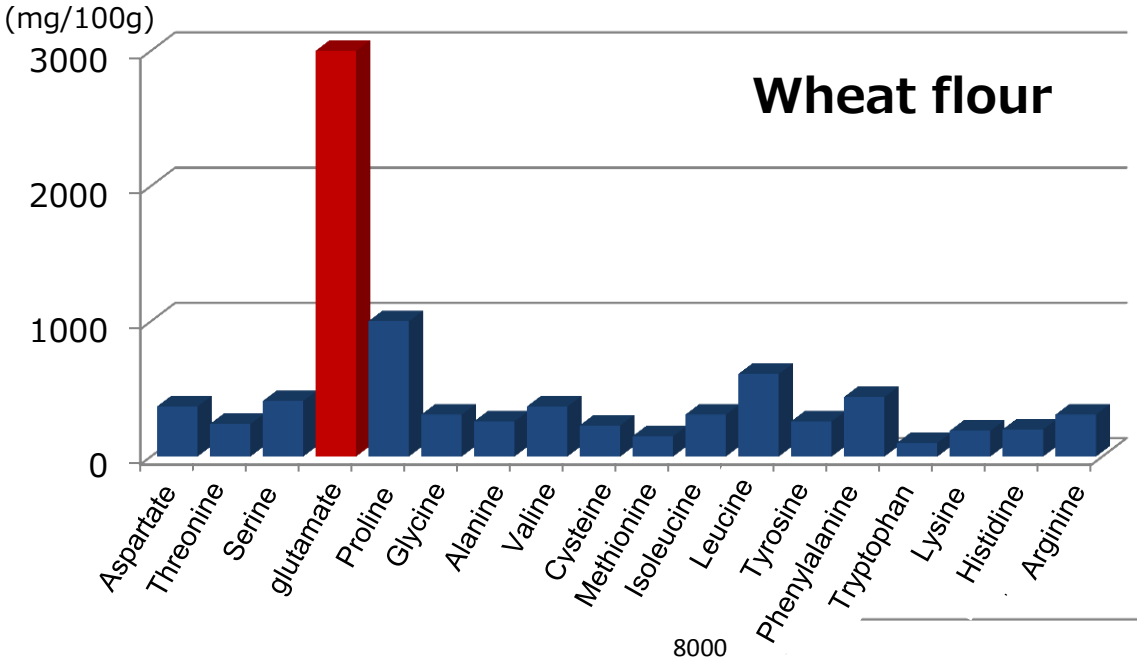
Seaweed ‘konbu’ and umami

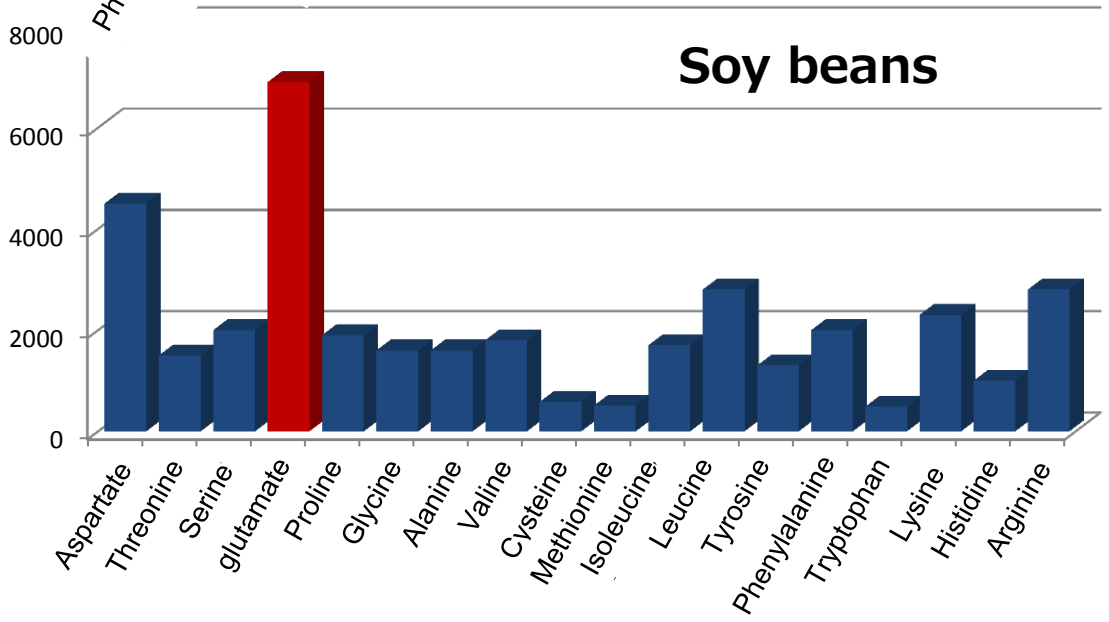
Dr. Kikunae Ikeda
succeeded in extracting 30g of glutamate from 12kg of ‘konbu’

The picture above shows a fifth of the above amount:
2.4kg of ‘konbu’ and 6g of *AJI-NO-MOTO®*

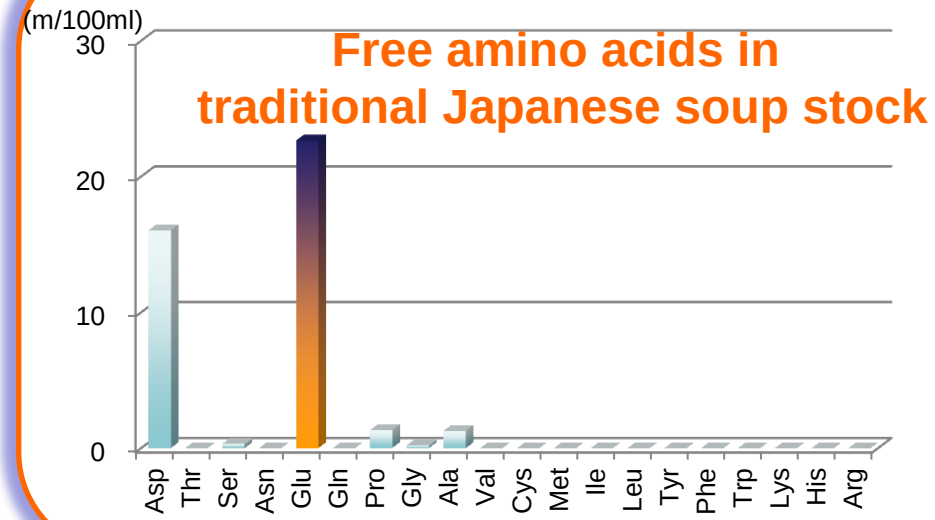
Ref. 1kg of ‘konbu’ = ¥1,000
glutamate extracted from ‘konbu’ = ¥4,000/g

Total amino acids in wheat flour and soy beans





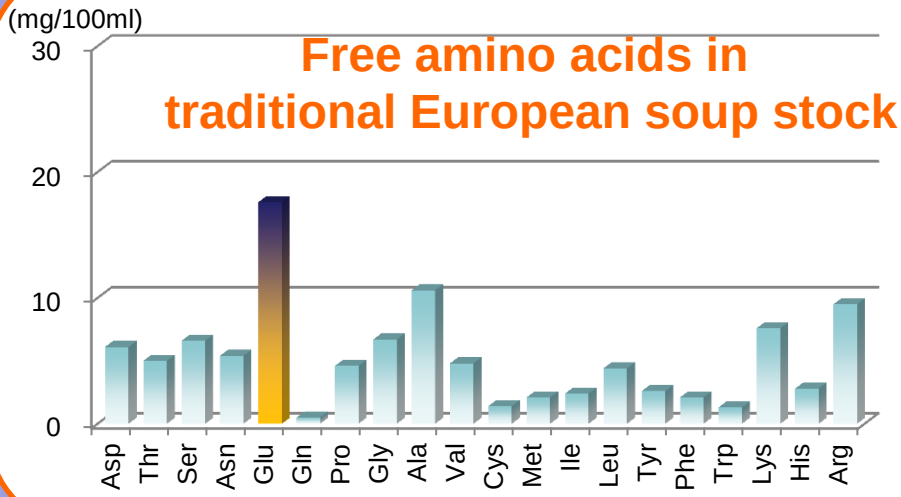
New products, MSG and bouillon cube, invented in Japan and Europe based on the traditional dietary culture



Kikunae Ikeda
(1864-1936)

1909

Isolate glutamate from gluten to produce MSG.



Julius Maggi
(1846-1912)

1886

1908

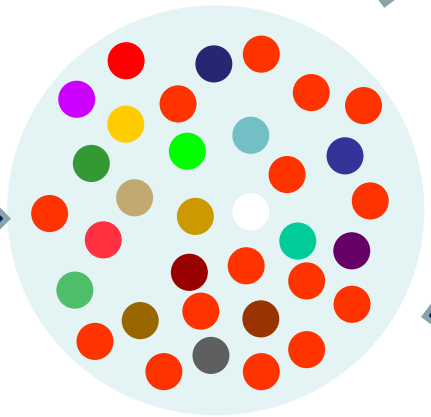
Use amino acids mixture to produce bouillon cube.

Production of seasoning based on amino acids

Use only glutamate

Umami seasoning (MSG) 1909

Hydrolyses



Use the mixture

Protein

(Wheat or soy beans)

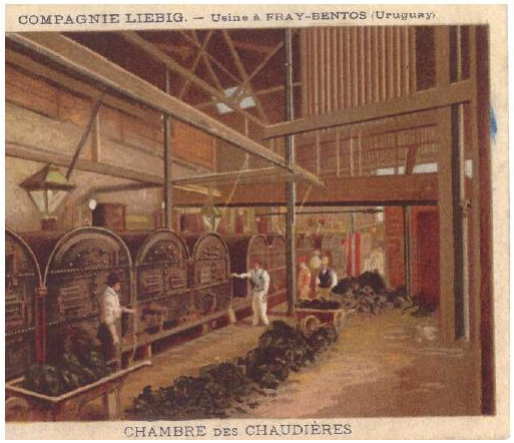
Free amino acids mixture

Bouillon cube 1908

Inexpensive seasonings that mass production possible

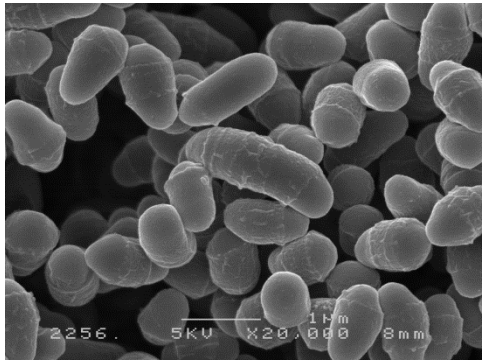
New seasonings from the end of 19th century to the early 20th century
All products except Japanese made from amino acid mixture.

1847 Concentrated beef extract developed by Justus von Liebig, cheap and nutritious meat substitute.
1886 Ready-made soup based on legume by Maggi.
1889 The Bovril company
1902 Marmite Food Extract Company
1908 Bouillon cube based on HVP
1909 MSG was developed in Japan
1910 OXO cube based on beef extracts



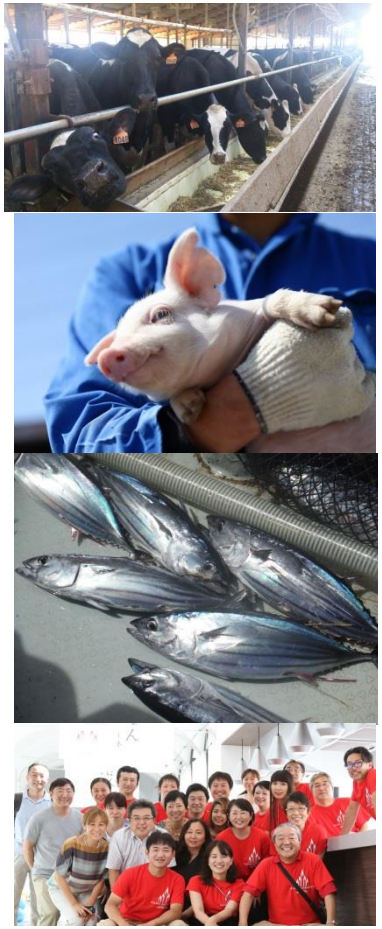
Amino acids are essential for living bodies

All of the creatures is making glutamate in the body.



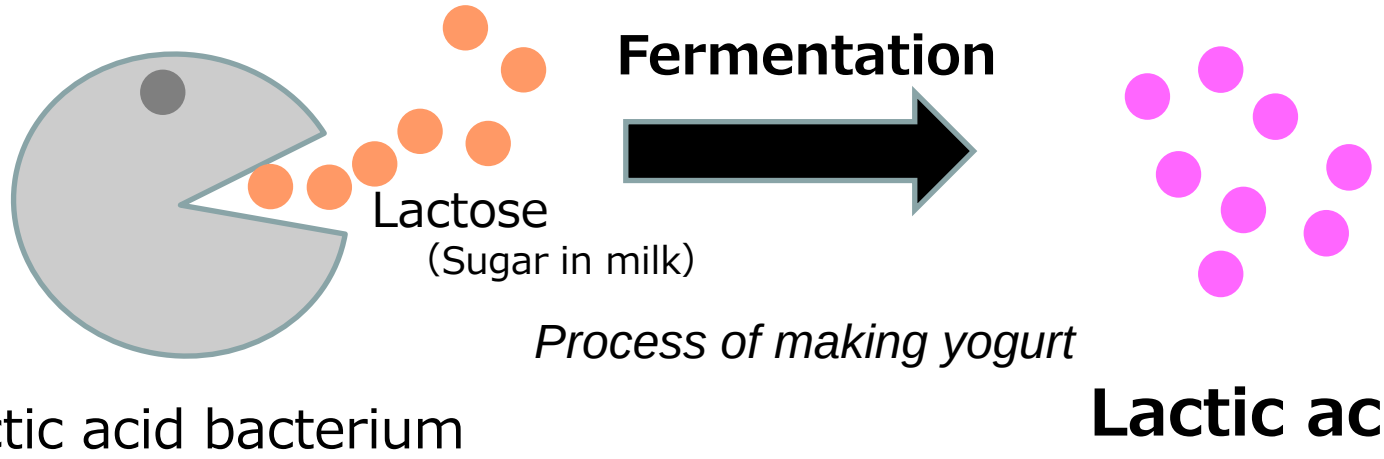
Microbe

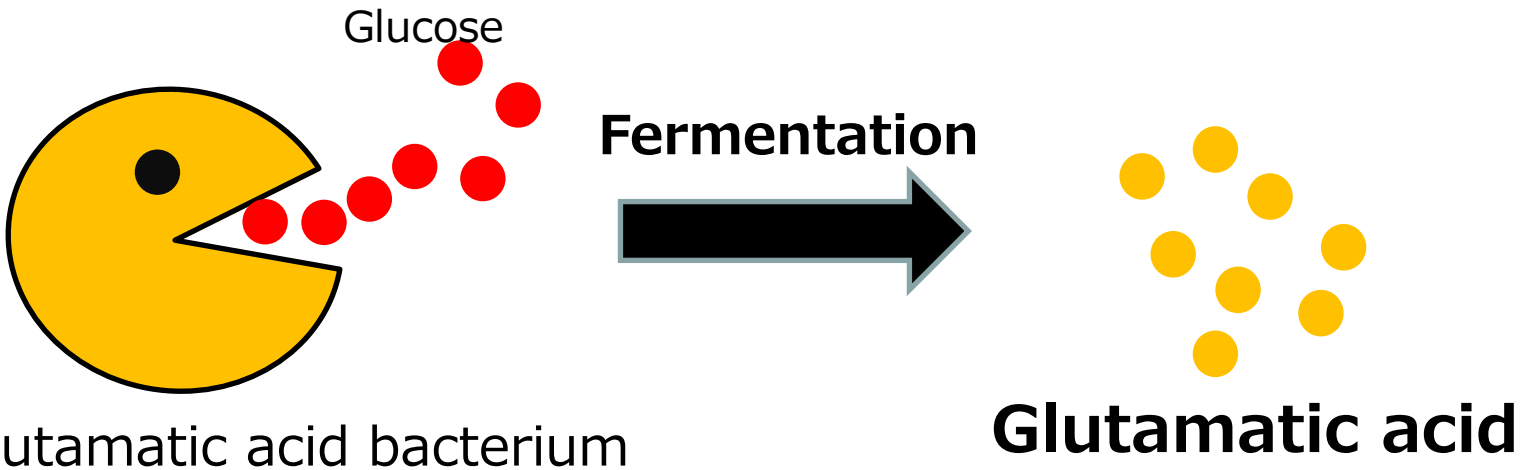
Plant



Animal

Miclobe create various substances

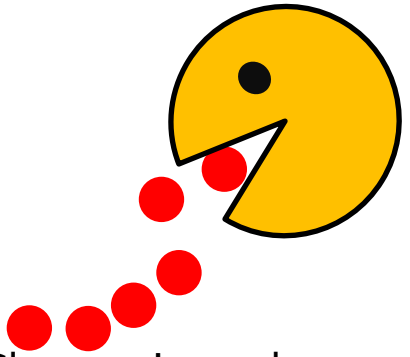




Glucose for fermentation from natural materials

Sugar cane

Molasses



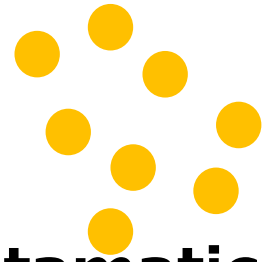
Glucose in molasses

Enzymatic degradation

Starch from corn or cassava

Starch is a long chain of glucose

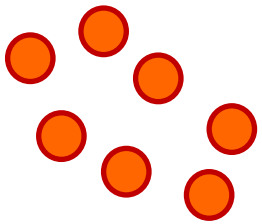
Neutralization makes MSG from glutamate



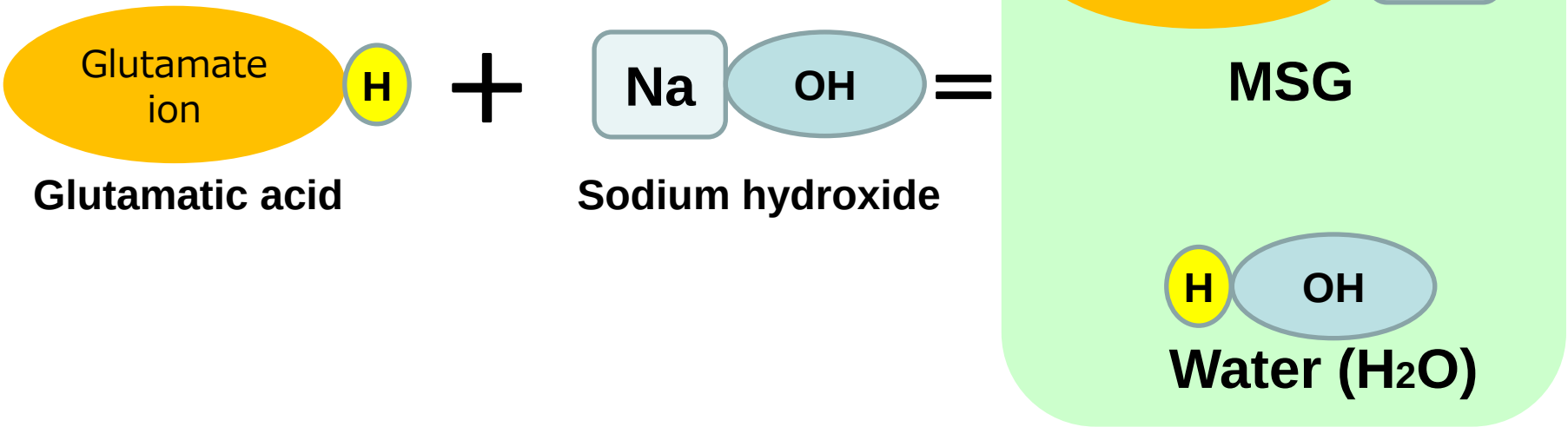
Glutamatic acid
Low solubility
Taste: Weak sour taste

Neutralization

by sodium hidroxide



MSG
(Mono Sodium Glutamate)
Easily soluble in water
Taste: Umami



Glutamatic acid **Sodium hydroxide**

Traditional umami foods around the world

Umami Summit in Milan

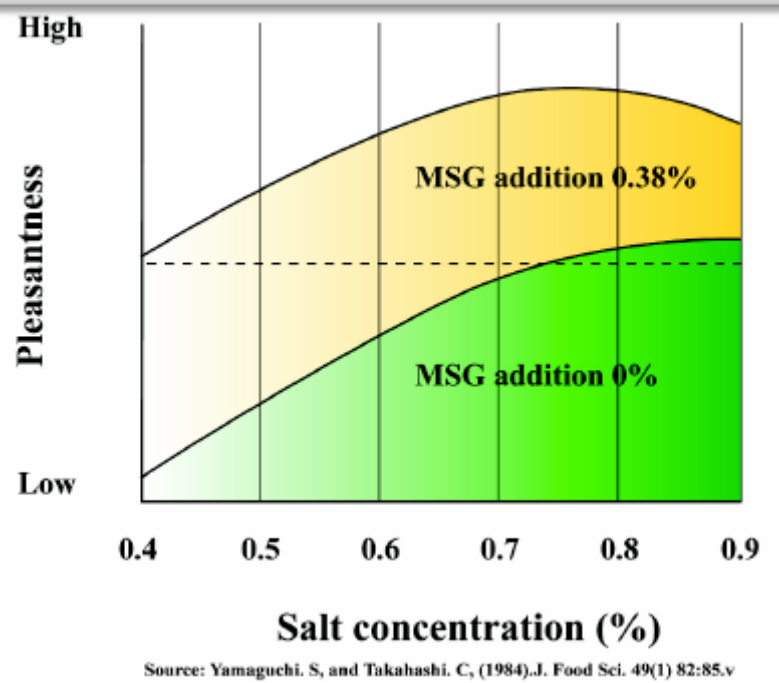
Master umami, transform your foods!
Organized by Ajinomoto Co., Inc.
July 10, 2015

University of Gastronomic Science
Italy
Gabriella Morini

Fermenting, drying and salting are processes for preserving food and making food more tasty. These processes are also developed ways to increase or concentrate glutamate.
Human beings have been exploring taste of glutamate ‘umami’ from Ancient times.
Umami is universal human taste!

Devise for eating delicious and low-salt

Effect of MSG on pleasantness of low salt clear soup

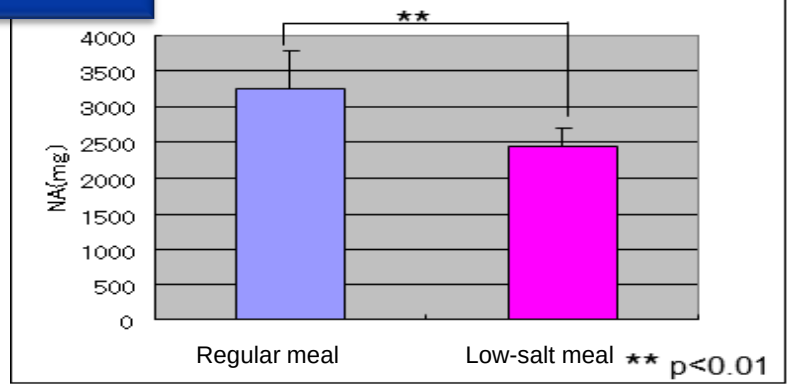


30 to 40 % salt reduction is available by adding MSG

Study on rate of consumption of low-salt meal of 20 inpatients
Test meal 1: regular meal (NaCl: 10 g/day)
Test meal 2: low-salt meal (NaCl: 7 g/day) + GluMg
Period: 2 weeks for each test meal

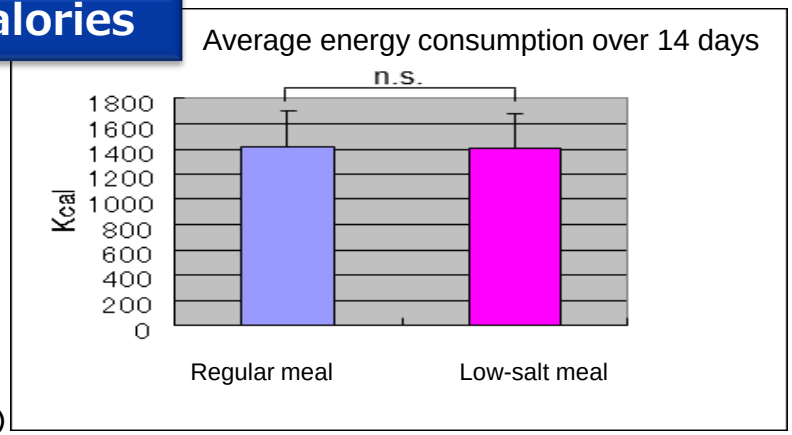
Salt

Average Na consumption over 14 days



Calories

Average energy consumption over 14 days



(Kojima et al, 2012)

Eat Umami, Eat Less

Understanding the role of umami in appetite control. /Sussex Univ.
'Umami flavor enhances appetite but also increase satiety'
published in American Journal of Clinical Nutrition in 2014

TIME magazine's online edition

Eat Umami, Eat Less
By Alexandra Sifferin, 7.21.2014
Calories count when it comes to Weight, but taste may play a role

Research suggested that umami (MSG+IMP) may act to both enhance flavor and promote a feeling of satiety.

27 participants were given a bowl of carrot soup with or without umami, carbohydrate and protein 45 minutes prior to lunch. Then a lunch, 450g (nearly 1 pound) plate of pasta with sauce was served.

Participants were given a survey to rate how alert, clear-headed, Energetic, full, hungry, nauseous, and/or thirsty they felt before eating. They also filled out surveys about their appetites and moods.

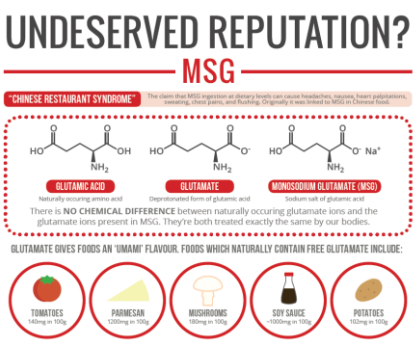
Underserved Reputation?

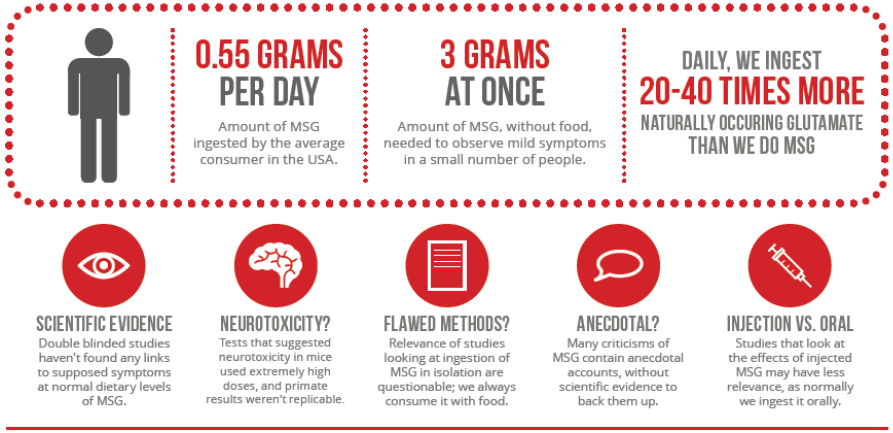
Is MSG bad for you?

August 2014 Consumer education on MSG
PDF and you tube
http://youtu.be/VJw8r_YWJ9k

Related web articles: 48 articles in 15 countries
(US, Canada、UK, Regalia、Poland、India、Malaysia、Singapore、Sri Lanka、Korea、Australia)

- There is no chemical difference between naturally occuring glutamate and the glutamate present in MSG.
- Daily, we ingest 20-24 times more naturally occuring glutamate than we do MSG.

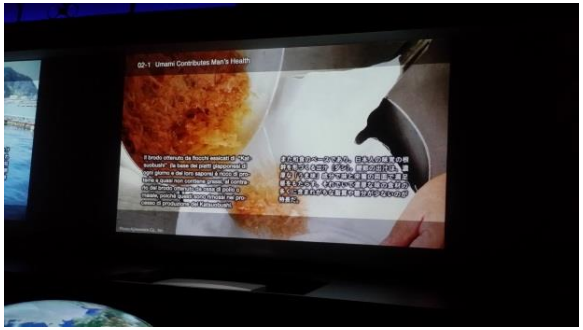


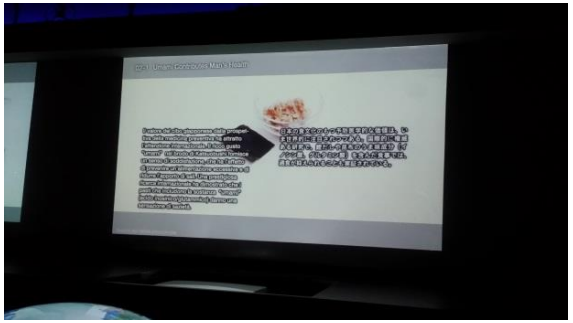


‘Washoku’ is Future Food

Message from Japan Pavilion at Expo Milano 2015

‘Dashi’ is the base of ‘washoku’ (Japanese cuisine) and forms the essence of Japanese palate. ‘Dashi’ satisfies us in terms of both taste and nutrition with its rich umami components. Nevertheless, it contains less fat and sugar which is usually high in rich-tasting foods.





The preventative medicine-like value of the Japanese food culture has begun to attract global attention. According to internationally authoritative studies, there is a possibility that meals containing umami substances of ‘konbu’ and ‘Katsuobushi’ dried bonito flakes (glutamates, etc.) can control overeating.

“Washoku‘s value is not limited to being Japan’s traditional food: It has hidden clues for designing the future food standards not only for Japanese but for people around the world.”

From ‘protecting tradition’ to ‘protecting the earth’

Japanese Food Culture: Overseas Expansion Prospects

Japanese cuisine has been increasingly attracting interest after 'washoku' was registered as an Intangible Cultural Heritage by UNESCO in 2013

2013
'Washoku' was registered as an Intangible Cultural Heritage by UNESCO

2015
Expo Milano 2015
Italy

2016
Rio 2016 Olympics & Paralympics

2018
2018 FIFA World Cup Russia™

2019
Tokyo Pre-Olympic

2020
Tokyo 2020 Olympics & Paralympics

Increasing interest in 'washoku' = the best opportunity for disseminating food culture overseas

We aim to solve social issues originating from nutrition and food resources and become a sustainable global food company group.

Eat Well, Live Well.

AJINOMOTO®