

## 2.9 Endowed Chair

### 2.9.1 Industrial Microbiology

*Staff      Professor                      : Yokozeki, Kenzo, Dr. Agric. Sci.*  
*Associate Professor: Hagishita, Tairo, Dr. Agric. Sci.*  
*Assistant Professor : Makoto Hibi Dr. Sci.*  
*Assistant Professor : Shigenobu Kishino Dr. Agric. Sci.*

*Students and research fellows*

*JSPS Research Fellow: (1)*

*Master's program        : (5)*

#### A. Research Activities

##### A-1. Main subjects

Our laboratory aims at creating industrial innovation by the application of novel functions being involved in microorganisms. It is important to find out something new while closely looking at nature without prejudice. From an industrial microbiology standpoint, a finding of novel and useful potential being involved in microorganisms is one of the most important points.

##### a) Efficient method for the production of peptides

We successfully developed a new enzymatic method producing peptides from unprotected starting materials. Our newly developed system brought about a simple and high yield process without protection and deprotection steps, and is applied to industrial production. Our recent discovery of enzyme potential would create innovation beyond common knowledge and attract big attention. Further work is in progress to explore a novel enzyme that can be widely use for the production of peptides

##### b) Industrial application of novel microbial aldolase

From a standpoint of process technology, the condensation reaction for the carbon-carbon bond formation that is extremely difficult by organic synthesis is very attractive reaction. Under this background, we are exploring novel aldolase which can catalyze the condensing reaction of carbon-carbon coupling to develop the production process of N- acetylneuraminic acid.

##### c) The industrial production of sugar alcohols

We work toward production of xylitol by the direct fermentation that assumed glucose starting materials. As a result of having widely screened a microbe from nature, we developed an efficient method (glucose → D-alabitol → xylitol) for the production of xylitol via D-alabitol which can be accumulated from glucose. To remove a rate-limiting factor, attempts at the enhancement of the cofactors supplies or at the change of the metabolism flux are currently in progress

##### d) Microbial production of amino acid derivatives

The hydroxyisoleucine that is slightly extracted from a plant seed is receiving particular attention as an anti-obesity drug. There are eight kinds of isomers to the hydroxyisoleucine. Microbial transformations with enzymes possessing stereospecificities have been applied to the asymmetric synthesis of them. We are exploring various kinds of enzymes participating in hydroxyisoleucine production widely.

e) Selective formation of functional fatty acids by microorganism

We are developing the conjugated fatty acids having various kinds of useful physiology. We are making research in microorganisms for the production of functional fatty acids, and found that lactic acid bacteria produce conjugated linoleic acids. Studies on purification, characterization and expression system of the enzymes involved in each reaction are also carried out. Further development of conjugated fatty acids production by lactic acid bacteria is going on.

## A-2. Publications and presentations

a) Publications

### ***Reviews***

Yokozeki K: A enzymatic breakthrough in the industrial production of oligopeptides. Speciality Chemicals Magazine 27; 44-45, 2007

Development of the industrial production of peptides by novel enzyme. GEKKAN Fine Chemical 37; 57-66, 2008 (in Japanese)

b) Conference and seminar presented

Annual Meeting of Japan Society for Bioscience, Biotechnology, and Agrochemistry 2008: 4 reports

II International Congress on Conjugated Linoleic Acid (CLA) : 2 reports

97th American Oil Chemists' Society Annual Meeting and Expo: 2 reports

Annual Meeting of the Society for Fermentation and Bioengineering, Japan 2007: 1 report

6th Lipid Reserch Seminar: 1 report

9<sup>th</sup> Meeting of Conjugated Linoleic Acid: 1 report

2008 Annual Meeting of Japan Society for Food Engineering: 1report

The 14th Annual Meeting of Kyusyu Branch of The Japan Wood Research Society: 1 report

Joint Annual Meeting of the Molecular Biology Society of Japan and the Japanese Biochemical Society, 2007: 1 report

## A-3. Off-campus activities

### ***Membership in academic societies (roles)***

Yokozeki, K.: Japan Society for Bioscience, Biotechnology, and Agrochemistry (delegate); The Society for Fermentation and Bioengineering, Japan (councilor); The Society of Enzyme Engineering (honorary member)

### ***Research grants***

Monbukagakusyo Research Grant: Young Scientist Research (B) Screening and characterization of anaerobic bacteria for the production of novel fatty acids (Kishino)

Scientist Research (A) Creationn of novel functional lipids by using multi-use of microbial functions (Hagishita, Hibi, Kishino)

Research project funded by New Energy and Industrial Technology Development Organization (NEDO): Selective formation of functional fatty acids by microorganism (Kishino)

21st Century COE program: COE for Microbial-Process Development Pioneering Future Production Systems (Yokozeki, Hagishita)

## **B. Educational Activities**

### **B-1. On-campus teaching**

#### a) Courses given

Undergraduate level: Industrial Microbiology (Yokozeki), Laboratory course in applied microbiology (Hagishita, Hibi, Kishino)

Graduate level: Industrial Microbiology (Yokozeki), Industrial Microbiology Seminar (Yokozeki, Hagishita, Hibi, Kishino), Experimental Course of Industrial Microbiology (Yokozeki, Hagishita, Hibi, Kishino)

### **B-2. Off-campus teaching, etc.**

#### *Part-time lecturer*

Yokozeki, K.: Kyoto Gakuen University; Soka University; Iwate University

#### *Open lectur organizer*

9th Mini Symposium of 21st Century COE Program, Okayama

## **2.9.2 AJINOMOTO Integrative Research for Advanced Dieting**

*Staff Professor : Dr Tohru Nishiyama*

*Associate Professor: Dr Masahiko Nonaka*

*Assistant Professor : Dr Hanae Yamazaki*

*Assistant Professor : Hiroaki Ito*

*Postdoctoral fellow : Dr Tetsuro Matsunaga*

## **A. Research Activities**

### **A-1. Main Subjects**

#### a) Physiological importance of Japanese traditional dried bonito broth

Our goal is to propose Japanese styles and concepts for healthy dieting based upon scientific evidence. In this study, we focused on Katsuo-Dashi (dried bonito broth) which is widely served in Japanese cuisine, its efficacy on health hasn't been authenticated. We've been conducting research using experimental animals (rats or Diabetic mice) fed Katsuo-Dashi for short or long term (2wks to 8wks). With prolonged feeding of Katsuo-Dashi, glucose-induced insulin secretion was well maintained and fat accumulation on both abdominal and liver were suppressed.

#### b) Association among genotype, nutrition and autonomic nervous system function.

The autonomic nervous system (ANS) is essential in maintaining organic homeostasis, including the regulation of both the cardiovascular system and energy balance, abnormalities of which are all assumed to be associated with etiology and pathology of cardiovascular and metabolic disorders. Genetic polymorphism, dietary habit, and their interactions are involved in the ANS function and its abnormality. The aim of this research project is to investigate the essential association of genetic factors of lifestyle-related diseases and dietary habit with ANS function in young, healthy Japanese.

c) Fundamental research for developing new processed foods and stockpiling foods

Some plant species, for example, *Helichrysum bracteatum* have aesthetic values without wilting or discoloration for many years. The mechanisms of structural maintenance and color stabilization could be applicable to improve the quality of dehydrated vegetables. In this research, we found the characteristic thickened secondary cell walls on the inside of the primary cell walls in both epidermal and inner cells by using transmission electron microscope(TEM), scanning electron microscope(SEM) and polarizing microscope. Characteristic thickened secondary cell walls have orientated cellulose microfibrils because these cell walls exhibited birefringence.

d) Health-promoting functions of Novel KYO-YASAI(KITAYAMA YUZENGIKU)

*Gymnaster koraiensis* (KITAYAMA YUZENGIKU) is one of the successful candidates as the alternative crops for rice fields in fallow. To promote its potential values, we investigated the health-promoting functions of *G.koraiensis*. So far, we found that the methanol extract of GK inhibited in vitro growth of *Helicobacter pylori* moderately.

## A-2. Publications

### Books

Matsunaga, T : Section 1 Chapter 7 Association of genetic polymorphisms with autonomic nervous system function in young males. ~adrenergic receptors and renin-angiotensin system~ Recent Progress in Nutrition and Food Research (Supervised by JAPANESE SOCIETY OF NUTRITION AND FOOD SCIENCE/ Edited by Tadashi Ogawa, Teruo Kawada, Junji Terao), pp.63-77, KENPAKUSHA., Tokyo, 2008 (in Japanese)

### Original papers

H. Ito, S. Yazawa, T. Nishiyama, and M. Nonaka: In vitro inhibition of *Helicobacter pylori* by several dietary plant agents. Int J Antimicrobial agent (in press), 2008

K. Nishikawa, H. Ito, T. Awano, M. Hosokawa and S. Yazawa: Characteristic thickened cell walls of the bracts of the 'eternal flower' *Helichrysum bracteatum*. Annals of Botany (in press), 2008

X-P. Wen, X-J. Zheng, H. Kawasaki, T. Tanbo, M. Nonaka, and D-X. Chen: Effect of *Panax notoginseng* (San Qi) and *Gynostemma pentaphyllum* (Jiao Gu Lan) on vascular remodeling in rabbits. Chinese J of Experimental Traditional Medical Formulae **13**(8): 24-28, 2007

Li Y., P. Wang, J. Xu, F. Gorelick, H. Yamazaki, N. Andrews, GV. Desir: Regulation of insulin secretion and GLUT4 trafficking by the calcium sensor synaptotagmin VII. Biochem Biophys Res Commun. 362(3): 658-64, 2007

Anderson EJ, H. Yamazaki, PD. Neuffer: Induction of endogenous UCP3 suppresses mitochondrial oxidant emission during fatty-acid supported respiration. J Biol Chem. 282(43): 31257-66, 2007

Zawalich WS, KC. Zawalich, H. Yamazaki: Divergent effects of epinephrine and prostaglandin E2 on glucose-induced insulin secretion from perfused rat islets. Metabolism. 56(1): 12-18, 2007

Yamazaki H, WS. Zawalich, KC. Zawalich: Desensitization of the pancreatic beta-cell: effects of sustained physiological hyperglycemia and potassium. Am J Physiol Endocrinol Metab. 291(6): H1381-H1387, 2007

### ***Reviews***

H. Yamazaki, M. Nonaka, and T. Fushiki: Fuel of the tissues and its metabolism. Nutritional evaluation and treatment **24**(4): 365-368, 2007 (in Japanese)

H. Yamazaki, and T. Fushiki : Science behind paratability. Sakae; Monthly journal for diabetic patients **47**(10): 38-41, 2007(in Japanese)

### **A-3. Off-campus activities**

#### ***Membership in academic societies***

M. Nonaka: Food hydrocolloids symposium (member of regular committee)

#### ***Research grant***

Matsunaga, T : Grant-in-aid for Young Scientists (start-up) provided by the Ministry of Education, Culture, Sports, Science and Technology, Japan. Association of genetic polymorphisms for lifestyle-related disease and nutrition with autonomic nervous system function. (Representative of the research)

### **A-4. International cooperations and overseas activities**

#### ***International meetings***

H. Ito: QMSCO (International Conference on Quality Management in Supply Chains of Ornamentals), Thailand (Poster presentation)

## **B. Education Activities**

### **B-1. On-campus teaching**

a) Course given

Graduate level: Food science and biotechnology II (T. Nishiyama, M. Nonaka)

## **2.9.3 Food and Agricultural Safety and Ethics**

*Staff Associate Professor: Hosono, Hiromi, D. Agric. Sci.*

*Assistant Professor : Kudo, Haruyo, D. Agric. Sci.*

## **A. Research Activities**

### **A-1. Main subjects**

a) The food-derived risk management system

In these days, food safety and environmental problems have become international issues and the economic and social globalization adds to the problem. It is now globally recognized that risk management should be based on scientific evidence. And to decide on a policy or regulation, we should compare cost-benefit balance of the options regarding social, cultural and economic factors. In our laboratory, we develop the guidance of risk management (according to planning, decision and evaluation of policy options) and study animal health economics basic to that. We also explore to develop evaluation method of the process of risk analysis.

b) Food, risk and science communication

Owing to the globalization of human activities and application of high technology, the situation around foods become more complex and access of process/quality information become more difficult.

Under this situation, it is essential to formulate common platform among scientists, citizen and administrator to solve food related problems. To enable this, we think not only information provisions, but also interactive communication is necessary. To achieve this, we try to establish concept and method of communication on risk, science, food and agriculture.

c) Agricultural, corporate and professional ethics

High technologies are applied also to agricultural sector, so it is required to establish ethics in agriculture as in medical science and in engineering.

And in the face of a series of food scandals, we think it is important to consider the ethics of food-businesses, technicians/ professionals in agriculture/livestock industry. We explore and develop the guidance of agricultural, corporate and professional ethics.

## A-2. Publications and presentations

a) Publications

***Original papers***

Hosono, H., Kudo, H., Niiyama, Y.: Consumers' milk choice behavior and palatability: an integrated study with point-of-purchase, information display board, questionnaire and palatability test approach. Japanese Journal of farm management 45(2), 153-158, 2007 (in Japanese)

Kono, H., Hosono, H. and Ito, S.: Infection of Toxoplasma gondii in Vietnamese pig production. The journal of veterinary epidemiology 11(2), 96-101, 2007 (in Japanese)

Hoa, N.T.M., Hosono, H., Kono, H., Dung N.T. and Ito S.; Development of the Live Pig Wholesaling Activity in Vietnam. Journal of Agricultural Development Studies 18(1) 2007

***Reports***

Niiyama, Y., Hosono, H. and Kudo, H.: Food choice behavior of consumer and consume of domestic agricultural products. Agriculture and Economy 74(2), 2008 (in Japanese)

Kono, H., Hosono, H. and Ito, S.: The Food System of Pork in Vietnam (10): Animal Feed Industry. Sustainable Livestock Production and Human Welfare, 62(3) (2008). (in Japanese)

Hosono, H., Ito, S. and Kono, H. The Food System of Pork in Vietnam (9): Retailer and consumer. Sustainable Livestock Production and Human Welfare, 61(11) (2007). (in Japanese)

Hosono, H., Ito, S. and Kono, S.: The Food System of Pork in Vietnam (8): Development Process of Pig Distributor. Sustainable Livestock Production and Human Welfare, 61(9) (2007). (in Japanese)

Hosono, H., Ito, S. and Kono, S.: The Food System of Pork in Vietnam (7): Abattoir in Rural Area. Sustainable Livestock Production and Human Welfare, 61(7) (2007). (in Japanese)

Kono, H., Ito, S. and Hosono, H.: The Food System of Pork in Vietnam (6): Abattoir in Metropolitan Area. Sustainable Livestock Production and Human Welfare, 61(5) (2007). (in Japanese)

Ito, S., Hosono, H. and Kono, H.: The Food System of Pork in Vietnam (5): Distribution Channel. Sustainable Livestock Production and Human Welfare, 61(4) (2007). (in Japanese)

Kudo, H. :Research Trend of Food-System study. Agriculture and Economy 74(6), 2008 (in

Japanese)

### ***Book Reviews***

Kudo, H."Matsuki, Y. and Huirne, R. eds. Food safety economics- risk analysis on food systems in the world" Journal of rural economics 79(4), 2008 (in Japanese)

b) Conference and seminar papers presented

Niiyama, Y., Hosono, H., Kawamura, R., Kiyohara, A., Kudo, H. and Kito.Y.: The Agricultural Economics Society of Japan (28<sup>th</sup> May 2008)

## **A-3. Off-campus activities**

### ***Research grant***

Hosono, H.: Grant-in-Aid for Scientific Research, Encouragement of Young Scientists (B): the role of social environmental factors in the prevalence process of animal health policies.

Hosono, H and Kudo,H.: Grant-in-Aid for Scientific Research (A): Food safety administration based on science/Establishment of risk analysis, profession and professional ethics (Co-Researcher)

Hosono, H: Grant-in-Aid for Scientific Research (B): study about the potential of relational marketing in the age of food safety/assurance (Co-Researcher)

## **A-4. International cooperations and overseas activities**

### ***International joint researches, overseas research surveys***

Surveillance study in Vietnam (Hosono)

Research trip for the study of relational marketing in Italy (Hosono)

## **B. Educational Activities**

### **B-1. On-campus teaching**

a) Courses given

Undergraduate level: Risk Management (Hosono/Kudo), Food Safety II (Hosono)

Graduate level: Advanced Risk Management I II (Hosono/Kudo)

### **B-2.Off-campus teaching, etc.**

#### ***Part-time lecturer***

Kyoto Notre Dame University (Kudo)

## **C. Other remarks.**

Hosono, H.: The Council of second central wholesale market in Kyoto City

Kudo,H. :encouraging prize of the agricultural economics society of Japan (28th March 2008)

Dean	Professor	Okumura, Shogo
Vice Dean	Professor	Endo, Takashi
Vice Dean	Professor	Fushiki, Tohru
Vice Dean	Professor	Hirata, Takashi
Vice Dean	Professor	Ueda, Kazumitsu

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Director, Division of Forest and Biomaterials Science	Professor	Ohta, Seiichi
Director, Division of Applied Life Sciences	Professor	Miyagawa, Hisashi
Director, Division of Applied Biosciences	Professor	Sakuma, Masayuki
Director, Division of Environmental Science and Technology	Professor	Futai, Kazuyoshi
Director, Division of Natural Resource Economics	Professor	Niiyama, Yoko
Director, Division of Food Science and Biotechnology	Professor	Murata, Kousaku

## Department

Dean, Department of Bioresource Science	Professor	Sako, Yoshihiko
Dean, Department of Applied Life Sciences	Professor	Matoh, Toru
Dean, Department of Agricultural and Environmental Engineering	Professor	Umeda, Mikio
Dean, Department of Food and Environmental Economics	Professor	Yoshida, Masayuki
Dean, Department of Forest and Biomaterials Science	Professor	Azuma, Jun-ichi
Dean, Department of Food Science and Biotechnology	Professor	Adachi, Shuji

## Facilities

Director, Experimental Farm	Professor	Yamada, Toshiaki
Director, Livestock Farm	Professor	Kume, Shinichi
Administration Bureau	General Manager	Kosaka, Yoshimi



Vice Dean	Professor	Ueda, Kazumitsu
Vice Dean	Professor	Endo, Takashi
Division of Agronomy and Horticultural Science	Lecturer	Nakazaki, Tetsuya
Division of Forest and Biomaterials Science	Associate Professor	Fujii, Yoshihisa
Division of Applied Life Sciences	Associate Professor	Shirai, Osamu
Division of Applied Biosciences	Associate Professor	Kawahara, Taihachi
Division of Environmental Science and Technology	Associate Professor	Nakashima, Hiroshi
Division of Natural Resource Economics	Associate Professor	Kawamura, Makoto
Division of Food Science and Biotechnology	Associate Professor	Yasukawa, Kiyoshi
Department of Bioresource Science	Professor	Tanisaka, Takatoshi
Department of Applied Life Sciences	Associate Professor	Shirai, Osamu
Department of Agricultural and Environmental Engineering	Associate Professor	Iida, Michihisa
Department of Food and Environmental Economics	Associate Professor	Kawamura, Makoto
Department of Forest and Biomaterials Science	Associate Professor	Fujii, Yoshihisa
Department of Food Science and Biotechnology	Associate Professor	Yasukawa, Kiyoshi
Livestock Farm	Professor	Kume, Shinichi
Experimental Farm	Associate Professor	Kitajima, Akira