

2.4.8 Laboratory : Nutritional Science for Animals

Member:	Professor	Matsui, Tohru, Dr. Agric. Sci.
	Associate Professor	Funaba, Masayuki, Dr. Agric. Sci.
	Assistant Professor	Torii, Shinichiro, Dr. Agric. Sci.
	Doctor's program	2
	Master's Program	6
	Undergraduate	5

A. Research Activities (2009.4-2010.3)

A-1. Main Subjects

a) Mineral nutrition and metabolism

We study mineral nutrition and metabolism using animals and cultured cells. Our goal is to develop optimal supply of minerals for animal production and health. This year, we focused on two studies; Study 1: Effects of magnesium deficient diet on zinc concentration and expression of metallothionein and a zinc transporter Zip14 in the liver of rats, and Study 2: Bioavailability of minerals in rats fed with seaweed. Results obtained in each study are as follows. Study 1: magnesium deficient diet increased zinc concentration in the liver and hepatic expression of metallothionein. Expression of Zip14 was also increased, but it was only transient. Study 2: Fermentability of seaweed but not solubility of calcium and magnesium potentially affected absorption of these minerals. Ingestion of Laminariaceae, which is highly fermentable, did not inhibit mineral absorption, and stimulated calcium and magnesium transport in the cecum.

b) Roles of the TGF- β family in mesenchymal cells

Members of the TGF- β family regulate cell growth and differentiation. We study function and signal transduction of the TGF- β family in mesenchymal cells in muscle and fat. Our goal is to provide basic information on animal growth. This year, we examined the role of the TGF- β family during adipocyte differentiation. Endogenous BMP activity was higher prior to differentiation stimulation, and it was required for efficient adipocyte differentiation.

A-2. Publications and presentations

a) Publications

Original Papers

- Chu, G.M., H. Ohmori, T. Kawashima, M. Funaba and T. Matsui: Brewer's yeast efficiently degrades phytate phosphorus in a corn-soybean meal diet during soaking treatment. *Anim Sci J* 80; 433-437, 2009
- Furutani, Y., M. Murakami and M. Funaba: Differential responses to oxidative stress and calcium influx on expression of the transforming growth factor- β family in myoblasts and myotubes. *Cell Biochem Funct* 27; 578-582, 2009
- Murakami, M., H. Kawachi, K. Ogawa, Y. Nishino and M. Funaba: Receptor expression modulates the specificity of transforming growth factor- β signaling pathways. *Genes Cells* 14; 469-482, 2009
- Murakami, M., F. Matsuzaki and M. Funaba: Regulation of melanin synthesis by the TGF- β family in B16 melanoma cells. *Mol Biol Rep* 36; 1247-1250, 2009
- Nakaya, K., R. Ooishi, M. Funaba and M. Murakami: A JNK inhibitor SP600125 induces defective cytokinesis and enlargement in P19 embryonal carcinoma cells. *Cell Biochem Funct* 27; 468-472, 2009
- Nishino, Y., R. Ooishi, S. Kurokawa, K. Fujino, M. Murakami, H. Madarame, O. Hashimoto, K. Sugiyama and M. Funaba: Gene expression of the TGF- β family in rat brain infected with Borna disease virus. *Microbes Infect* 11; 737-743, 2009
- Okayama, S., N. Miura, M. Murakami, M. Funaba and Y. Nishino: Changes in Borna disease virus genome with adaptation to host. *Microbes Infect* 11; 721-724, 2009
- Suenaga, M., T. Matsui and M. Funaba: BMP Inhibition with dorsomorphin limits adipogenic potential of preadipocytes. *J Vet Med Sci* 72; 373-377, 2010
- Takasugi, S., T. Matsui and H. Yano: Iron supplementation by intraperitoneal injection eliminates the accumulation of hepatic copper induced by excess calcium in rats. *Br J Nutr* 102; 258-263, 2009
- Fujihara, T., and T. Matsui: The degradation characterization of roughages in the rumen of sheep. *Jpn J Sheep Sci* 46; 12-19, 2009 (in Japanese)
- Kawachi, H., S. Maruakma, Y. Kamei, T. Kawada and T. Matsui: Investigation for activators of adipocyte differentiation in feed for beef cattle. *Trace Nutr Res* 26; 65-69, 2009 (in Japanese)
- Kawachi, H., T. Tanaka, M. Funaba and T. Matsui: The reduction of triglyceride concentration in the liver of Syrian Hamsters *Mesocricetus auratus* given concentrated and desalted plum vinegar. *J Pet Anim Nutr* 12; 1-6, 2009 (in Japanese)

- Morihiro, K., N. Hishiyama, M. Funaba and T. Matsui: Relationship between plasma concentrations of vitamin C and serum biochemical parameters related to liver diseases in dogs. Trace Nutr Res 26; 93-95, 2009 (in Japanese)
- Torii, S., T. Matsui, A. Tsuruta and T. Sakurai : Survey of iron concentration of feed ingredients and final diets in commercial cow-calf operations and finishing beef cattle farms in Japan. Nihon Chikusan Gakkaiho 81; 47-52, 2010 (in Japanese with English abstract)

b) Conference and seminar papers presented

- The 112th Meeting of Japanese Society of Animal Science: 2 presentations
- The 59th Meeting of Kansai Animal Science Society: 2 presentations
- The 26th Meeting of Japan Trace Nutrients Research Society: 4 presentations
- The 48th Meeting of Japanese Society of Nutrition and Food Science (Kinki region): 1 presentation
- The 63rd Annual Meeting of Japanese Society of Nutrition and Food Science: 1 presentation
- The 29th Meeting of The Japanese Society for Magnesium Research: 2 presentations
- The 32nd Meeting of The Molecular Biology Society of Japan: 3 presentations
- The 47th Meeting of Society of Beef Cattle Science: 2 presentations

A-3.Off-campus activities

Membership in academic societies

- Matsui, Tohru, D.Agric.Sci : Japanese Society of Animal Science (Editor, Councilor), Japanese Trace Nutrient Research Society (Director, Editor), Japanese Society for Magnesium Research (Councilor), Japanese Society of Animal Nutrition and Metabolism (Councilor, Editor), Japanese Association of Pet Animal Nutrition (Director, Editor), Society of Beef Cattle Science (Councilor), Kansai Society of Animal Science (Editor), Japanese Society of Nutrition and Food Science-(Councilor), Japanese Society of Nutrition and Food Science-Kinki Section (Councilor)
- Funaba, Masayuki, Dr. Agric. Sci. : Japanese Association of Pet Animal Nutrition (Editor), Kansai Society of Animal Science (Secretary)
- Torii, Shinichiro, Dr. Agric. Sci. : Society of Beef Cattle Science (Secretary)

Research grants

1. Grants-in-aid for Scientific Research(KAKENHI)

- Challenging Exploratory Research : Matsui, Tohru, Dr. Agric. Sci. : The development of methods for detection of toxic heavy metals in animal feed

2.Other Research Grants

- Sponsored Research Funds : Matsui, Tohru, Dr. Agric. Sci. : Establishment of daily allowance of trace minerals in Wagyu cattle given domestic feeds for improving reproduction and calf growth

B.Educational Activities(2009.4-2010.3)

B-1.On-campus teaching

a) Courses given

- Undergraduate level : Comparative Physiology (Matsui et al), Basic Bioresource Science (Matsui et al), Cell Biology I (Matsui et al), Outline of Bioresource Science II (Matsui et al), Animal Physiology (Matsui et al), Animal Nutrition (Matsui, Funaba), Physiological Nutrition of Animals (Matsui, Funaba), Fundamentals for the Experiments for Bioresource Science (Matsui, Torii et al), Laboratory Course in Bioresource Science I and II (Matsui, Funaba, Torii et al), Introduction to Foreign Literature in Bioresource Science II (Funaba et al), Seminar for Applied Animal Science I and II (Funaba et al)
- Graduate level : Seminar in Nutritional Science of Animals (Matsui, Funaba and Torii), Laboratory Course in Nutritional Science of Animals (Matsui, Funaba and Torii), Trace Nutrient Science in Animals (Matsui)

B-2.Off-campus teaching etc.

Part-time lecturer

- Matsui, T.: School of Environmental Science, University of Shiga Prefecture (Environmentology for Animal Production)

C.Other Remarks

- Matsui, Tohru, Dr. Agric. Sci. : Committee on Standard Methods for Feed Analyses, Fertilizer and Feed Inspection Services (Member), Subcommittee of Agricultural Industry,

Evaluation Committee of Incorporated Administrative Agency, The Ministry of Agriculture, Forestry and Fishery (Specialist), Japanese Committee on ISO TC34/SC10, The Ministry of Agriculture, Forestry and Fishery (Specialist), Committee on Preparation of Tables of Feed Composition for Animals, The Ministry of Agriculture, Forestry and Fishery (Member)