

The physiological functions of mammalian animals

Lab. Animal Physiology and Functional Anatomy

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Our research aims to elucidate the relationship between environmental factors, such as global warming, and the physiological functions of animals at the molecular, cellular, tissue and whole-body levels, thus contribute to improvement of the health and the productivity of livestock animals with functional ingredients.

The utilization of functional ingredients for improvement of physiological, immune and reproductive functions

Animals occasionally suffer physiological, immunological and reproductive disorders by environmental changes. We assess the effects of functional ingredients in diets on mammalian physiological functions by biochemical, histopathological and molecular-biological techniques.

- Improvement of intestinal immunity of neonates by beta-carotene
- The effect of phytoestrogens on the calcium methabollism in pregnant and lactating mice
- Amelioration of heat stresses on bovine preimplantation embryos by astaxanthin

Development of the ecological management system for dairy and beef cattle

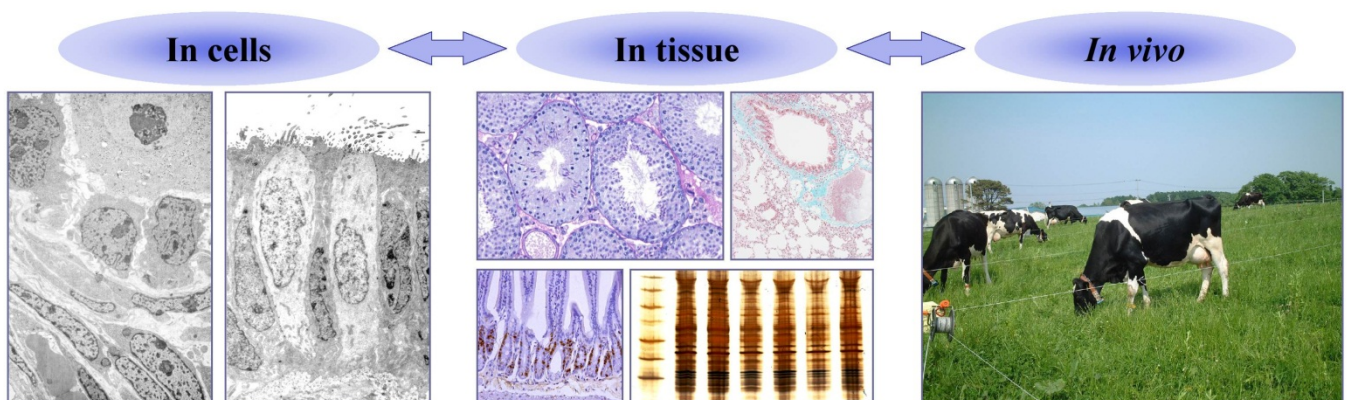
Cattle yield nutritious milk and meat from grasses inedible for humans; on the other hand, excrete the methane gas and nitrogen and phosphorus, which are causes of the global warming and water pollution. To develop ecological livestock management system, we clarify the effect of heat stress and other factors on their metabolism using biochemical and nutrition physiological techniques.

- Development of environment-conserving cattle breeding system utilizing domestic roughage
- Improvement of the productivity and water utilization of livestock cattle in hot environment

Factors regulating mammalian reproductive functions

Domestic animals with high performance often have low reproductive ability, which results in the lowered productivity. We are analyzing the factors involved in the mammalian reproductive processes and are developing techniques to improve reproductive efficacies and to avoid disorders.

- Factors involved in the development and function of ovaries and utilization of oocytes
- Effects of environmental factors on the development of mammalian preimplantation embryos



Keywords

Animal, mammal, mouse, cattle, physiology, functional morphology, environment

Recent Publications

Effects of feeding whey protein on growth rate and mucosal IgA induction in Japanese black calves

Yasumatsuya K, Kasai K, Yamanaka K, Sakase M, Nishino O, Akaike M, Mandokoro K, Nagase T, Kume S (2012)
Livestock Science 143: 210-213

Effects of folic acid on the development and oxidative stress of mouse embryos exposed to heat stress

Koyama H, Ikeda S, Sugimoto M, Kume S (2012)
Reprod Domest Anim (Online published ahead of print)

Review: Roles of one-carbon metabolism in preimplantation period—Effects on short-term development and long-term programming—

Ikeda S, Koyama H, Sugimoto M, Kume S (2012)
J Reprod Dev 58:38-43.

Importance of methionine metabolism in morula-to-blastocyst transition in bovine preimplantation embryos

Ikeda S, Sugimoto M, Kume S (2012)
J Reprod Dev 58:91-97

Effects of coumestrol administration to maternal mice during pregnancy and lactation on renal Ca metabolism in neonatal mice

Ueda M, Horiguchi Y, Sugimoto M, Ikeda S, Kume S (2012)
Animal Science Journal (Online published ahead of print)

Effects of bisphenol A administration to pregnant mice on serum Ca and intestinal Ca absorption

Otsuka H, Sugimoto M, Ikeda S, Kume S (2012)
Animal Science Journal 83:232-237.

Effect of RNA interference of BID and BAX mRNAs on apoptosis in granulosa cell-derived KGN cells

Sai T, Matsuda F, Goto Y, Maeda A, Sugimoto M, Gao HM, Kabir AK, Li JY, Manabe N (2012)
J Reprod Dev 58:112-116

Effects of coumestrol administration to pregnant and lactating mice on intestinal alkaline phosphatase activity

Kirihata Y, Horiguchi Y, Ueda M, Sugimoto M, Ikeda S, Kume S (2011)
Phytotherapy Research 25:654-658

Relationships between urine pH and electrolyte status in cows fed forages

Kume S, Sato T, Murai I, Kitagawa M, Nonaka K, Oshita T (2011)
Animal Science Journal 82:456-460

Effects of supplemental β -carotene with whey on IgA transfer from maternal milk and mucosal IgA induction in neonatal mice and calves

Nishiyama Y, Yasumatsuya K, Kasai K, Sakase M, Nishino O, Akaike M, Nagase T, Sugimoto M, Ikeda S, Kume S (2011)
Livestock Science 137:95-100

Supplemental β -carotene increases IgA secreting cells in mammary gland and IgA transfer from milk to neonatal mice

Nishiyama Y, Sugimoto M, Ikeda S, Kume S (2011)
British Journal of Nutrition 105:24-30

Bid and Bax are involved in granulosa cell apoptosis during follicular atresia in porcine ovaries

Sai T, Goto Y, Yoshioka R, Maeda A, Matsuda F, Sugimoto M, Wongpanit K, Jin H, Li JY, Manabe N (2011)
J Reprod Dev 57:421-427

Changes in the expression of decoy receptor 3 in granulosa cells during follicular atresia in porcine ovaries

Sugimoto M, Kagawa N, Morita M, Kume S, Wongpanit K, Jin H, Manabe N (2010)
J Reprod Dev 56:467-474

Effects of astaxanthin-containing oil on development and stress-related gene expression of bovine embryos exposed to heat stress

Namekawa T, Ikeda S, Sugimoto M, Kume S (2010)
Reprod Domest Anim 45:e387-e391

Expression of methylation pathway enzymes in bovine oocytes and preimplantation embryos

Ikeda S, Namekawa T, Sugimoto M, Kume S (2010)
J Exp Zool A Ecol Genet Physiol 313: 129-136

Evaluation of drinking water intake, feed water intake and total water intake in dry and lactating cows fed silages

Kume S, Nonaka K, Oshita T, Kozakai T (2010)
Livestock Science 128: 46-51

Effects of high potassium chloride supplementation on water intake, urine volume and nitrogen balance in mice

Murai I, Sugimoto M, Ikeda S, Kume S (2010)
Animal Science Journal 81: 80-84

Dynamic expression of vimentin in bovine blastocysts in extended in vitro culture

Ikeda S, Sugimoto M, Kume S (2010)
Reprod Domest Anim 45: 295-301

Nitrogen, phosphorus, and potassium utilization and their cycling in a beef-forage production system

Tabata Y, Togo D, Kitagawa M, Oishi K, Kumagai H, Kume S, Hirooka Y (2009)
Animal Science Journal 80: 475-485

Enhancement of histone acetylation by trichostatin A during in vitro fertilization of bovine oocytes affects cell number of inner cell mass of the resulting blastocysts

Ikeda S, Tatemizo A, Iwamoto D, Taniguchi S, Hoshino Y, Amano T, Matsumoto K, Hosoi Y, Iritani A, Saeki K (2009)
Zygote 17: 209-215

Evaluation of urinary nitrogen excretion from plasma urea nitrogen in dry and lactating cows

Kume S, Numata K, Takeya Y, Miyagawa S, Ikeda S, Kitagawa M, Nonaka K, Oshita T, Kozakai T (2008)

Asian-Aust J Anim Sci 21:1159-1163

Effects of urinary excretion of nitrogen, potassium and sodium on urine volume in dairy cows

Kume S, Nonaka K, Oshita T, Kozakai T, Hirooka H (2008)

Livestock Science 115: 28-33

Coumestrol decreases intestinal alkaline phosphatase activity in post-delivery mice but does not affect vitamin D receptor and calcium channels in post-delivery and neonatal mice

Kirihata Y, Kawarabayashi T, Imanishi S, Sugimoto M, Kume S (2008)

J Reprod Dev 54: 35-41

Effects of high KCl supplementation on growth rate and renal function in mice

Murai I, Imanishi S, Sugimoto M, Kume S (2008)

Animal Science Journal 79: 243-247

The effect of feed regimen on chewing time, digesta passage rate and particle size distribution in Holstein non-lactating cows fed pasture ad libitum

Oshita T, Sudo K, Nonaka K, Kume S, Ochiai K (2008)

Livestock Science 113: 243-250

Changes in expression and localization of GPRC5B and RAR α in the placenta and yolk sac during middle to late gestation in mice

Imanishi S, Sugimoto M, Morita M, Kume S, Manabe N (2007)

J Reprod Dev 53: 1131-1136

The effect of vitamin C supplementation on plasma concentration and urinary excretion of vitamin C in cattle

Padilla L, Matsui T, Ikeda S, Kitagawa M, Yano H (2007)

J Anim Sci 85: 3367-3370

Retinoid receptor-specific agonists regulate bovine in vitro early embryonic development, differentiation and expression of genes related to cell cycle arrest and apoptosis

Rodriguez A, Diez C, Caamano JN, de Frutos C, Royo LJ, Munoz M, Ikeda S, Facal N, Alvarez-Viejo M, Gomez E (2007)

Theriogenology 68: 1118-1127

Identification, isolation, and in vitro culture of porcine gonocytes

Goel S, Sugimoto M, Minami N, Yamada M, Kume S, Imai H (2007)
Biol Reprod 77: 123-137

Effects of maturing stage of corn hybrids on silage yield, feeding value for dairy cows and milk production in a cold region of Japan

Oshita T, Takayama H, Otsuka S, Igarashi H, Nonaka K, Kume S (2007)
Asian-Aust J Anim Sci 20: 511-516

Abilities of cumulus and granulosa cells to enhance the developmental competence of bovine oocytes during in vitro maturation period are promoted by midkine; A possible implication of its apoptosis suppressing effects

Ikeda S, Saeki K, Imai H, Yamada M (2006)
Reproduction 132: 549-557

Apoptosis-independent poor morphology of bovine embryos produced by multiple ovulation

Ikeda S, Prendes JM, Alonso-Montes C, Rodríguez A, Díez C, Kitagawa M, Imai H, Gómez E (2006)
Reprod Domest Anim 41: 383-385

Retinoids during the in vitro transition from bovine morula to blastocyst

Rodríguez A, Díez C, Ikeda S, Royo LJ, Caamaño JN, Alonso-Montes C, Goyache F, I Alvarez, Facal N, Gómez E (2006)
Hum Reprod 21: 2149-2157

Nuclear receptors, small molecules and reproductive biotechnology

Gómez E, Díez C, Caamaño JN, Goyache F, Royo LJ, Rodríguez A, de Frutos C, Facal N, Ikeda S (2006)
AETE Newsletter 25:11-13

A physiologically based pharmacokinetic model for endosulfan in the male Sprague-Dawley rats

Chan MP, Morisawa S, Nakayama A, Kawamoto Y, Sugimoto M, Yoneda M (2006)
Environ Toxicol 21:464-478

Feeding alfalfa silage on methane production in dry and lactating cows

Kume S, Nonaka K, Oshita T, Kozakai T, Kojima K (2005)
Proc. 2nd Greenhouse Gases and Animal Agriculture 428-43

Effects of feeding and animal performance on nitrogen, phosphorus and potassium excretion by Holstein cows

Kojima H, Kume S, Nonaka K, Oshita T, Kozakai T, Hirooka H (2005)
Animal Science Journal 76: 139-145

Toxicokinetics of (14)C-endosulfan in male Sprague-Dawley rats following oral administration of single or repeated doses

Chan MP, Morisawa S, Nakayama A, Kawamoto Y, Sugimoto M, Yoneda M (2005)
Environ Toxicol 20: 533-541

Effects of in utero exposure to bisphenol A on mRNA expression of arylhydrocarbon and retinoid receptors in murine embryos

Nishizawa H, Morita M, Sugimoto M, Imanishi S, Manabe N (2005)
J Reprod Dev 51:315-324

Microtubule organization during rabbit fertilization by intracytoplasmic sperm injection with and without sperm centrosome

Morita J, Terada Y, Hosoi Y, Fujinami N, Sugimoto M, Nakamura S-I, Murakami T, Yaegashi N, Okamura K (2005)
Reprod Med Biol 4:169-178

Disposition of bisphenol A in pregnant mice and fetuses after a single and repeated oral administration

Kawamoto Y, Matsuyama W, Morikawa M, Morita M, Sugimoto M, Manabe N, Morisawa S (2005)
Toxicol Environ Chem 87: 199-213

Effect of high potassium intake from alfalfa silage on mineral status in sheep and periparturient cows

Kume S, Toharmat T, Ridla M, Nonaka K, Oshita T, Nakamura M, Yamada Y, Ternouth JH (2004)
Res Bull Natl Agric Res Cent for Hokkaido Reg 181:1-14

Effects of forage type on particle size distribution of ruminal digesta and faeces of non-lactating cows fed high quality forage

Oshita T, Nonaka K, Kume S, Nakui T (2004)
Livestock Production Science 91:107-115