

## Chair     Animal Anatomy, Nutrition and Resources

### 2.4.10     Laboratory : Animal Husbandry Resources

Member Professor	Hirooka, Hiroyuki, D. Agric. Sci.
Associate Professor	Kumagai, Hajime, D. Agric. Sci.
Assistant Professor	Oishi, Kazato, MSc. Agric. Sci.
Doctor's program	3
Master's Program	10
Undergraduate	4

#### **A. Research Activities (2010.4-2011.3)**

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

###### a) Total evaluation for animal production systems

Data and information on genetic performance, nutrition, management and economic situations for beef, dairy, pigs, sheep and goats were collected from various research fields concerning animal sciences in order to evaluate total animal production systems. Modeling and simulation of such systems were carried out.

###### b) Studies on livestock production systems in tropical areas

Surveys have been conducted to investigate various performances of native livestock, nutrient requirements of the livestock, feeding system, quality of feeds and grassland production in tropical areas. Such information will be used to search better strategies for improving the existing systems. Sustainable farming systems integrated between livestock and crops in smallholders in the developing countries were evaluated through modeling works. The surveys have been conducted in the south area of Thailand and in the central area of Nepal.

###### c) Studies on environmental problems in animal production

Since animal industries have been specialized and scaled up, environmental pollution caused by such animal industries led to serious problems in society in Japan. Models for predicting excretion of nitrogen and phosphorus from animal production systems were developed and a country-wide fact-finding studies of the connection between crop and animal industries were performed in order to define the role of animal industry in establishing a sustainable agriculture.

###### d) Studies on effective utilization of unused resources as fodders of animals

Use of by-products as feeds of ruminants have been considered as one of the ways to do resources recycling effectively. Therefore, evaluation of several by-products as feed resources, development of organic, chemical and physical treatments to improve forage quality of the by-products, and use of forages made from the by-products in dairy cattle and beef cattle productions have been carried out. The by-products included woody resources such as bamboos, residues of Yam production, fermented by-products, etc.

## **A-2.Publications and presentations**

### **a) Publications**

#### Original Papers(including book-reviews)

- Oishi, K., H. Kumagai, and H. Hirooka; Application of the modified feed formulation to optimize economic and environmental criteria in beef cattle fattening systems with food by-products. *Animal Feed Science and Technology*, 2011 (in press)
- Oishi, K., T. Ibi, A. K. Kahi, and H. Hirooka: Optimal culling strategy in relation to biological and economic efficiency and annualized net revenue in the Japanese Black cow-calf production system. *Journal of Agricultural Science, Cambridge*, 2011 (in press)
- Kumagai, H., B. R. Baral, T. Shiino, N. R. Devkota, K. Oishi, and H. Hirooka: Effects of plane of nutrition on growth feed intake, digestibility and nitrogen balance in Murrah graded male buffalo (*Bubalus bubalis*) calves in Nepal. *Animal Science Journal*, 2011 (in press)
- Kato, Y., K. Oishi, H. Kumagai, S. Ishida, Y. Aihara, E. Iwama, O. Enishi, A. Ikeguchi, A. Ogino, and H. Hirooka: Life cycle assessment of beef-fattening production systems using least cost rations with different amounts of calcium soaps of linseed oil fatty acids. *Journal of Japanese Agricultural System Society*, 2011 (in press) (In Japanese with English abstract)
- Hirooka, H., and K. Oishi: Least cost ration formulation with whole crop rice silage for beef production. *Nihon Chikusan Gakkaiho* 81; 333-343, 2010 (In Japanese with English abstract)
- Hayashi, Y., K. Shah, H. Kumagai, and S. K. Shah: Comparison of bodyweight and body size of growing buffaloes between large and small scale farms in Nepal. *Revista Veterinaria* 1; 781-783, 2010
- Kato, Y., M. Ito, and H. Hirooka: Genetic parameters of serum vitamin A and total cholesterol concentrations and the genetic relationships with carcass traits in F1 cross between Japanese Black steers and Holstein dams. *Journal of Animal Science* 89; 951-958, 2011
- Kimura, S., K. Oishi, H. Hirooka, D. Yokoi, and H. Kumagai: Effect of supplementary nucleic acids on in vitro ruminal fermentation of roughage and concentrate as substrate. *Nihon chikusan gakkaiho* 81; 457-466, 2010. (In Japanese with English abstract)
- Kojima, T., K. Oishi, N. Ohta, M. Yoshioka, H. Kumagai, K. Moriya, and H. Hirooka: Patterns of spatial distribution and their relationship with energy expenditure of grazing cattle in abandoned fields using GPS and GIS. *Journal of Japanese Agricultural Systems Society* 26; 141-149, 2010. (In Japanese with English abstract)

- Samiei, A., J. B. Liang, G. R. Ghorbani, H. Hirooka, H. Yaakub, and M. Tabatabaei: An evaluation of  $\beta$ -hydroxybutyrate in milk and blood for prediction of subclinical ketosis in dairy cows. *Polish Journal of Veterinary Science* 13; 349-356, 2010

- Kojima, T., K. Oishi, N. Ohta, M. Yoshioka, H. Kumagai, K. Moriya, and H. Hirooka: Derivation of a regression equation to estimate the ratios of energy expenditure of walking on the level and on gradients to that of standing and application of the equation for the estimation of energy expenditures grazing cows in abandoned paddy fields. *Nihon Chikusan Gakkaiho* 81; 189-197, 2010. (In Japanese with English abstract)

#### Reviews

- Hirooka, H.: Evolution of breeding value estimation -From index selection to genomic selection-. *The Journal of Animal Genetics* 38; 93-98, 2010. (In Japanese)

- Hirooka, H.: Systems approaches to beef cattle production systems using modeling and simulation. *Animal Science Journal* 81; 411-424, 2010

#### Reports,others

- Kojima, T., K. Oishi, and H. Hirooka: Grazing behavior of Japanese Black cows in abandoned paddy fields - Estimation of energy expenditure and utilization distribution of cows -. *Livestock Technology* 670; 7-11, 2011. (In Japanese)

#### b) Conference and seminar papers presented

- The Annual Meeting of Japanese Agricultural Systems Society in Spring symposium 2010: 1 Presentation

- The Annual Meeting of Japanese Agricultural Systems Society in Autumn symposium 2010: 1 Presentation

- The 60th Annual Meeting of Kansai Society of Animal Science: 2 Presentations

- The 13th Animal Science Congress of the Asian Australasian Association of Animal Production Society: 3 Presentations

- International Symposium on Tsotope Ecology 2010 in Kyoto: 1 Presentation

### **A-3.Off-campus activities 1**

#### Membership in academic societies

- Hirooka, H. : Japanese Society of Animal Science (Representative), Japanese Agricultural System Society (Director, Editor), Kansai Society of Animal Science (Councilor), Society of Beef Cattle Science (Councilor), Japanese Society of Animal Breeding and Genetics (Editor), Japanese Animal Production System Society (Councilor)

- Kumagai, H. : Society of Beef Cattle Science (Editor), Japanese Animal Production System Society (Secretary), Japanese Society of Grassland Science (Councilor)

- Oishi, K. : Japanese Animal Production System Society (Secretary)

### **A-3.Off-campus activities 2**

#### Research grants

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

- Grant-in-Aid for Scientific Research (B) for foreign studies : Kumagai, H. : Evaluation of the relationships among production efficiency, nutrient use efficiency and plane of nutrition for indigenous cattle in South-East Asia

- Grant-in-Aid for Young Scientists (B) : Oishi, K. : The grazing animal and native grassland: quantification of animal productivity and control of native grassland under grazing production system

- Grant-in-Aid for Scientific Research (A) for foreign studies : Inamura, T. (Part: Hirooka, H.) : Evaluation and mitigation of the influence of intensive agriculture on environmental pollution in western part of inland China

##### 2.Other Research Grants

- Research aid from Ministry of Agriculture, Forestry and Fisheries, 2010 fiscal year : Ishida, S. (Part: Hirooka, H.): Development of the economical and environmental beef production technique that can produce beef containing high n6/n3 contents

- Research and development projects for application in promoting new policy of Agriculture Forestry and Fisheries, 2010 fiscal year : Ieki, H. (Part: Kumagai, H., Hirooka, H., and Oishi, K.): Development of bamboo pellets for cattle feed: improvement of digestibility in ligneous resources by culturing with the white-rot fungus

- Contract project sponsored by the Ministry of Agriculture Forestry and Fisheries, 2010 fiscal year: Development of high value-added domestic animal products based on the use of domestic feeds : Nonaka, K. (Part: Kumagai, H., Hirooka, H., and Oishi, K.): Evaluation of characteristics and functionality of local feeds as resources of TMR silage

### **A-4.International cooperation and overseas activities 2**

#### Visiting Research Scholars

- Guest professor 1 (Malaysia)

### **B.Educational Activities(2010.4-2011.3)**

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

a) Courses given

- Undergraduate level: Outline of Bioresource Science II (Hirooka et al.), Production of Animal Husbandry Resources (Hirooka), Fundamentals for the Experiments of Bioresource Science (Kumagai et al.), Introduction to Foreign Literature in Bioresource Science II (Kumagai et al.), Laboratory Course in Bioresource Science I, II (Kumagai, Oishi et al.), Applied Animal Sciences (Kumagai), Seminar in Applied Animal Science I, II (Kumagai, Oishi et al.), Livestock Production Techniques and Practice II (Hirooka et al.)
- Graduate level: Seminar of Animal Husbandry Resources (Hirooka, Kumagai, Oishi), Laboratory Course of Animal Husbandry Resources (Hirooka, Kumagai, Oishi), System Science for Animal Production (Hirooka), Livestock Production and Technology in Overseas (Kumagai)

### **B-3.Overseas teaching 1**

#### International students

- International students : Master 2 (Indonesia)