

## SUSTAINABLE AGRICULTURE MODELING GROUP

### PERSONNEL

#### **Dr Ermias Kebreab (Associate Professor, Canada Research Chair)**

Dr Qiang Huang (Research associate)

Ms Jennifer Ellis (PhD. Candidate)

Mr Alexander Yitbarek (MSc. Candidate)

Ms Neijat Mohammed (MSc. Candidate)

In addition, 2 Research Associates and 2 PhD candidates are expected to join the group in 2009.

### RESEARCH STATEMENT

The group aspires to understand, and engage colleagues and students in achieving this understanding, the operation and control of a sustainable agricultural production system, centred on sound environmental and economic principles. The group has a multi-disciplinary approach to research in areas including crop physiology, ecology, animal nutrition (including ruminants, swine and poultry), and a range of mathematical modelling techniques. Our objective is to develop and carry out a research plan to study qualitative and quantitative aspects of sustainable agricultural production systems.

### RESEARCH PROJECTS

**Modelling Sustainable Agricultural Systems.** (05/07) *NSERC – Canada Research Chairs Programme.*

**Nutrient management planning for nursery, finisher pig and sow operations using extant and new feed consumption models and manure analysis.** (11/07) *Manitoba Agriculture Food and Rural Initiatives (MAFRI). Sustainable Development Initiative Fund and Manitoba Livestock Manure Management Initiative.*

**Nutrient management planning for finisher pig operations using extant and new feed consumption models and manure analysis – Greenhouse gas measurements.** (02/08) *MAFRI.*

**Modelling rumen function in non-steady state.** (04/08) *NSERC Discovery.*

**Poultry model development.** (03/08) *Manitoba Rural Adaptation Council.*

**Development of swine nutrient utilization model.** (04/08) *Agri-Food Research and Development Initiative.*

**Comparison of economic and environmental efficiencies of advanced beef production systems in the Western Canadian Parkland** (04/08) *Agri-Food Research and Development Initiative.*

**Developing a strategy for forage and grassland management through an examination of value in terms of forage productivity and environmental sustainability including nutrient management, biodiversity, erosion and water management, and agri-tourism.** (05/08) *Manitoba Rural Adaptation Council/Manitoba Cattle Producers' Association.*

**An Examination of the Multi-functionality of Forages in Manitoba.** *Manitoba Forage Council.*

**Developing a strategy for forage and grassland management through an examination of the multi-functionality of forages in terms of productivity and environmental sustainability.** (06/08). *Beef Cattle Research Council.*

**Nutrient transformations and prediction of greenhouse gas emissions from stored manure.**  
(08/08). *Agricultural Sustainability Initiative*.

**TEACHING**

The group is involved in teaching or part-participating in the following courses:

Mathematical Modelling of Agricultural Systems	Applications in Agroecology
Graduate Seminar	Advanced Animal Nutrition

**SELECTED PUBLICATIONS**

**Kebreab, E.**, N. E. Odongo, B. W. McBride, M. D. Hanigan and J. France. 2008. Phosphorus utilization and environmental and economic implications of reducing phosphorus pollution from Ontario dairy cows. *J. Dairy Sci.* 91:241-246.

AlZahal, O., **E. Kebreab**, J. France, M. Froetschel and B. W. McBride. 2008. Ruminant temperature may aid in the detection of subacute ruminal acidosis. *J. Dairy Sci.* 91:202-207.

Dijkstra, J., **E. Kebreab**, A. Bannink, L. A. Crompton, S. López, P. A. Abrahamse, P. Chilibroste, J. A. N. Mills, and J. France. 2008. Comparison of energy evaluation systems and a mechanistic model for milk production by dairy cattle offered fresh grass-based diets. *Anim. Feed Sci. Technol.* 143:203-219.

Jalilvand, G., A. Naserian, **E. Kebreab**, N.E. Odongo, R. Valizadeh, F. Eftekhar Shahroodi, S. Lopez, and J. France. 2008. Rumen degradation kinetics of alfalfa hay, maize silage and wheat straw treated with fibrolytic enzymes. *Archivos de Zootecnia*, 57:155-164.

Ellis, J. L., J. J. Thomason, **E. Kebreab** and J. France. 2008. Calibration of estimated biting forces in domestic canids: Comparison of post-mortem and *in vivo* measurements. *J. Anatomy*, 212:769-780.

Schulin-Zeuthen, M., **E. Kebreab**, J. Dijkstra S. Lopez, A. Bannink, and J. France. 2008. A comparison of the Schumacher with other functions for describing growth in pigs. *Anim. Feed Sci. Technol.* 143:314-327.

Bannink, A, J. France, S. Lopez, W. J. J. Gerrits, **E. Kebreab**, and J. Dijkstra. 2008. Modelling the implications of feeding strategy on rumen fermentation and functioning of the rumen wall. *Anim. Feed Sci. Technol.* 143:3-26.

Dias, R. S., **E. Kebreab**, D. M. S. S. Vitti, A. P. Roque, and J. France. 2008. Application and comparison of two models to study the effects of calcium sources in sheep. *Anim. Feed Sci. Technol.*, 143:89-103.

Hill, S. R., K. F. Knowlton, **E. Kebreab**, J. France, and M. D. Hanigan 2008. A model of phosphorus digestion and metabolism in the lactating dairy cow. *J Dairy Sci.* 91:2021-2032.

Ellis, J. L., J. Dijkstra, **E. Kebreab**, A. Bannink, N. E. Odongo, B.W. McBride, J. France. 2008. Aspects of rumen microbiology central to mechanistic modelling of methane production in cattle. *J. Agric. Sci.* 146:213-233.

**Kebreab E.**, J. France, H. Darmani Kuhl and S. Lopez. 2008. A comparative evaluation of functions for partitioning nitrogen and amino acid intake between maintenance and growth in broilers. *J. Agric. Sci.* 146:163-170.

Fathi Nasri, M. H., J. France, M. Danesh Mesgaran, and **E. Kebreab**. 2008. Effect of heat processing on ruminal degradability and intestinal digestibility of nitrogen and amino acids in Iranian whole soybeans. *Livest. Sci.* 113:43-51.