

# Introduction to the Symposium: Appropriate Animal Models for Nutritional Research in Health and Disease<sup>1,2</sup>

Chad H. Stahl,<sup>3\*</sup> Xingen Lei,<sup>4</sup> and Brian Larson<sup>5</sup>

<sup>3</sup>Department of Animal Science, North Carolina State University, Raleigh, NC 27695; <sup>4</sup>Department of Animal Science, Cornell University, Ithaca, NY 14853; and <sup>5</sup>Nutrition Science, Kellogg, Battle Creek, MI 49014

Historically, many nutritional scientists studied basic animal nutrition; however, as nutritional science has evolved and become more specialized, fewer nutritional scientists are trained in basic animal nutrition. Today an important area of animal nutrition is the development of models to examine the nutritional effects in human health and disease. Despite this increasing area of focus, there is a lack of interface between animal scientists and human nutritionists, who would benefit from working together. Although the purposes may differ, fundamental nutritional research in agriculturally relevant species provides valuable information for both animal agriculture and human health. By realizing this mutual benefit and using it as a rallying point for research collaborations, animal scientists and human nutritionists could make far greater progress in nutritional science.

This symposium was an opportunity for both animal and human nutrition researchers to meet and discuss and redefine strategies relating to the use of experimental animal nutrition knowledge. This symposium was intended to provide both conceptual and technical guidance to help expand the interactions between animal and human nutritionists. To accomplish these goals the following were emphasized in this symposium:

**1) *The interactive roles of human and animal nutritional scientists.*** Despite the recent division seen between many human and animal nutritional scientists, it is important to note that advances in each field have been fueled by discoveries in the other. Basic nutrition discoveries in laboratory animals, fueled by human nutrition needs, have frequently been expanded and explored for applications to large animal research, and likewise, discoveries in animal agriculture have also been utilized to make great progress in human nutritional research. Understanding and appreciating the contributions that human and animal nutritional

scientists make to each other's fields, as well as the importance of this dynamic in accelerating translational research, are to the benefit of all.

**2) *The benefits of large animal research models for nutrition.*** Large animal research models for nutrition have received little attention from most human nutritional scientists in recent years. In this symposium, the benefits of various large animal models were discussed, with a predominant benefit being recognized as greater physiological similarity to humans than rodents.

**3) *Creating research harmony between human and large animal nutrition research.*** A major emphasis of this symposium was to demonstrate the value of experimental animal nutrition to human nutritional scientists. In addition to the readily apparent benefit of potentially more physiologically relevant animal models, there is a less tangible, but no less important, benefit from the interaction of human and animal nutritional scientists—exposure to the diversity of ideas. By bringing together researchers in the same field who address research problems from different points of view, far greater strides can be made in our understanding of nutritional science.

In the first article in this symposium, "Animal models in nutrition research," Baker (1) discusses the many nutritional and metabolic differences among animal models. This article also presents examples of how food and laboratory animal species have contributed valuable information for human nutritionists on nutrient × nutrient interactions, nutrient bioavailability in foods, and nutrient tolerances and toxicities. In "Regulation of fat synthesis by CLA: Lactation and the ruminant model," Bauman et al. (2) discuss and demonstrate the unique value of cows as a model to investigate the role of CLA in the regulation of milk fat synthesis during lactation. They also show the value of a large animal model in establishing a biologically relevant model for nutritional genomics research and the role nutrients can play in the regulation of gene expression. In the final article of this symposium, "The Development of Porcine Models of Obesity and the Metabolic Syndrome," Spurlock and Gabler (3) present some of the challenges of utilizing rodents as a model for humans in obesity research and discusses how a swine model is

<sup>1</sup> Published as a supplement to *The Journal of Nutrition*. Presented as part of the symposium "Appropriate Animal Models for Nutritional Research in Health and Disease" given at the 2007 Experimental Biology meeting, April 29, 2007, Washington, DC. The symposium was sponsored by the American Society for Nutrition and supported in part by Nestlé and Hill's Pet Nutrition. The symposium was chaired by Chad H. Stahl of North Carolina State University, Xingen Lei of Cornell University, and Brian Larson of Kellogg.

<sup>2</sup> Author disclosures: C. H. Stahl, X. Lei, and B. Larson, no conflicts of interest.

\* To whom correspondence should be addressed. E-mail: chad\_stahl@ncsu.edu.

emerging as an attractive biomedical model for energy metabolism and obesity in humans.

With a better appreciation of the contributions of the others' work to the larger field of nutritional sciences, we hope to increase the collaborations between human and animal nutritional scientists. We feel that these collaborations will allow for greater benefit for both animal agriculture and human health as well as nutritional sciences as a whole.

## Literature Cited

1. Baker DH. Animal models in nutrition research. *J Nutr.* 2008;138:391–6.
2. Bauman DE, Perfield JW II, Harvatine KJ, Baumgard LH. Regulation of fat synthesis by conjugated linoleic acid: lactation and the ruminant model. *J Nutr.* 2008;138:403–9.
3. Spurlock MK, Gabler NK. The development of porcine models of obesity and the metabolic syndrome. *J Nutr.* 2008;138:397–402.