Animal health—From systems biology to translational research. C. Gay*, USDA-ARS Office of National Programs, Beltsville, MD.

Genome-enabled technologies are driving fundamental changes in the approaches used to understand mechanisms of disease, selection of animals for beneficial health traits, and discovery of tools to control and mitigate animal diseases. New research strategies using high-throughput gene expression analysis are providing novel platforms for more comprehensive understanding of host–pathogen interactions. In particular regard to application of the findings that result from these new technical capabilities, a systems biology approach has begun, is evolving in focus, and rapidly revolutionizing the analysis of whole genome responses of host and pathogens, which will ultimately lead to a better understanding of disease processes in affected animals. Concurrently, the capabilities facilitate new insights into the mechanisms through which pathogens evade host immunity, the genetic basis of host–pathogen interactions, and ultimately the discovery of novel and highly effective vaccines, drugs, biotherapeutics, and integrated management strategies that ensure the abundance and safety of the food supply while maintaining its economic affordability to all.

Key Words: animal, disease, intervention

Respiratory disease management in livestock—New challenges and knowledge gaps. What is critical on the horizon? A. W. Confer*, Oklahoma State University, Stillwater.

Despite availability and use of numerous bovine respiratory pathogen vaccines and new antimicrobial drugs as well as a greater understanding of the pathogenesis of bovine respiratory disease (BRD), pneumonia ranging from subclinical to fatal remains a major cause of morbidity, mortality, and economic loss to the beef and dairy cattle industries. Gaps in our BRD knowledge that could greatly enhance our clinical management schemes mainly fall into 4 general questions. The objective of this presentation is to address briefly each question from the standpoint of general current knowledge and what we need to know to improve management and control of BRD. First, various environmental factors and stressors stimulate potential pathogens that are quiescent in the nasopharynx to replicate and be inhaled, resulting in disease. Can a better understanding of this process translate into improved disease management? Second, currently published studies indicate low heritability for BRD resistance. Can BRD mor-

Key Words: cattle, disease, management
ovarian systems respond to elevated temperatures, endotoxemia, and LPS-induced inflammation is of obvious interest. Further, determining how these systems are homeostatically and homeorhetically coordinated to prioritize acclimation and survival vs. agriculturally productive purposes would presumably enlighten mechanisms amenable to manipulation. In summary, heat stress is 1 of the primary hurdles to efficient animal production. Defining the physiology and mechanisms that underlie how heat stress jeopardizes animal performance is critical for developing approaches to ameliorate current production issues and a prerequisite for generating future strategies (genetic, managerial, nutritional, and pharmaceutical) to improve animal well-being and performance.

**Key Words:** heat stress, insulin, intestinal integrity

---

**0063 Ensuring good health and well-being in the aging equine population.** K. Malinowski*, R. C. Avenatti, and K. H. McKeever, Rutgers Equine Science Center, New Brunswick, NJ.

One of the largest industries in the United States involves horses, a $39.2 billion business associated with 9.2 million animals. The horse industry’s contribution to the U.S. gross domestic product is $102 billion, generating more than 1.4 million full-time equivalent jobs across the country. More than 15% of the equine population is > 20 yr old and many of these animals continue to participate in athletic activities. Partly responsible for the increased lifespan of horses is the fact that equine nutritionists have advanced the development of “senior feeds,” and that the animal pharmaceutical industry has developed effective anthelments for parasite control. However, advancing age in horses is often associated with declining body condition, muscle tone, aerobic capacity, thermoregulatory ability in response to acute exercise, and general well-being. While aging and obesity-related loss of function and diseases have many factors, understanding the underlying imbalance of molecular signaling mediators in metabolically important tissues, such as muscle, to preserve functionality of physiological systems, needs to be addressed. Advanced age in horses is associated with a decline in immune response and is characterized by increased production of pro-inflammatory cytokines, termed inflammageing, which has been linked to obesity. Horses > 20 yr old can improve aerobic performance, reduce body fat, and partially restore changes that occur in the hypothalamic-pituitary-adrenal axis, in response to acute exercise and insulin sensitivity with regular exercise training. Physiological similarities between humans and horses allow for broad implications of equine exercise physiology research in relation to aging and performance. Understanding the molecular mechanisms behind the adaptive response to exercise will aid in the development of exercise conditioning and nutritional strategies meant to preserve the health and well-being of this socioeconomically important species.

**Key Words:** aging, exercise, horses