

**10 Genetics and genomic approaches to address both breeding and management issues of poultry well-being.** W. M. Muir\* and T. Nguyen, *Purdue University, West Lafayette, IN.*

Classical genetics and genomics can both be utilized to improve productivity. However, if applied to the wrong unit of selection (the individual), well-being can be compromised due to social interactions, while if applied at the production level unit (cage or pen), well-being will always be improved. For non socially induced issues, such as leg problems, direction selection is necessary; unfortunately such traits usually have low heritabilities and are difficult to quantify. Whole genome selection shows great promise to address these types of problems, both by increasing the accuracy of selection and by reducing the need to phenotype candidates. Unresolved issues are 1) how to quantify well-being and 2) which management practices necessarily compromise well-being. All physiological responses to the environment are mediated by genes interacting with other genes and/or environmental inputs. These interactions occur first at the RNA level, which are then translated into structural or regulatory proteins. Physiological quantification of well-being has usually occurred at the protein level or higher. But not all proteins can or have been quantified. An alternative is to quantify and profile the transcriptome through cDNA re-sequencing or microarrays. Quantifying the transcriptome profile in known conditions, or among questionable conditions, followed by supervised or unsupervised clustering respectively, and discriminant analysis, allows a scientific approach to combine or classify like management practices into states of well-being and thus offers a holistic metric for comparison. Finally, the physiological mechanisms that change as a result of genetic selection that impact well-being are not well understood. Again functional genomics comparing response of all genes in the transcriptome followed by gene ontology and path analysis allows us to uncover previously unsuspected mechanisms, which can in turn be used to modify management to address those mechanisms. Both genomic selection and functional genomics

approaches to address well-being are a direct result of sequencing the poultry genome.

**Key Words:** classification, welfare, breeding, stress, behavior

**11 Modification of animals versus modification of the production environment to meet welfare needs.** S. E. Aggrey\*, *University of Georgia, Athens.*

The balance between genetic modification and welfare may be as old as “the chicken and egg debate”. Meeting welfare needs of farm animals has become an integral part of animal agriculture. Until recently, environmental and management modifications have been the methods of choice for meeting welfare needs of animals. While genetic selection over the past 50 years has improved growth, livability and general welfare, some aspects of welfare like metabolic disorders, susceptibility to some diseases and skeletal problems have increased. Several reports have demonstrated genetic variability in behavioral and physiological traits relating to welfare thus raising the possibility of selecting for welfare-related traits. Recent advances in molecular biology have also made it possible for the identification of quantitative trait loci for behavioral and welfare traits. Identification of causal or associative genes for welfare traits and improved biotechnology tools raises the possibility of either selecting for improved welfare or genetically modifying birds to suit commercial production environments. However, animal welfare is not only a scientific or commercial producers concern but public acceptance is equally important. Therefore, an integration of management, genetics and genome tools should be employed to genetically improve production and welfare traits with concurrent welfare risk assessments to address public and consumer concerns.

**Key Words:** welfare, genetic modification, environmental modification, selection, genomics

## **National Extension Workshop: What Is Needed to Improve University and Industry Collaboration**

**12 Washington update.** R. D. Reynnells\*, *USDA/CSREES/PAS, Washington, DC.*

The activities and observations of the author are reported. The 2009 Extension Special Recognition Award is presented to Jacquie Jacob, University of Kentucky, for her sustained, significant contributions to the PSA National Extension Workshop, National Poultry Waste Management Symposium, other extension programming, and the American Poultry Historical Society. The National Institute of Food and Agriculture has replaced the Cooperative State Research, Education and Extension Service, and the Agriculture and Food Research Initiative has replaced the National Research Initiative. Progress is being made in multi-state research committees: the Agricultural Bioethics (NCCC209) web site will facilitate writing collaborative papers on bioethics, and animal welfare or well-being (more participates are welcome); NE1022 is being rewritten as NEmpl1561, Optimization of Poultry Welfare and Production Systems for the 21st Century. Portfolio reviews are yearly (Knowledge Area (KA) 306, Environmental Stress in Animals; KA308, Improved Animal Products (Before Harvest); KA315, Animal Welfare), with a five year summary review due in 2009. The

2009 Southern Region (Quadrennial) Poultry Extension Workshop, will be in Raleigh, NC, November 9 - 12 (contact Ken Anderson for details). Proceedings are available for the 2008 National Poultry Waste Management Symposium. Edgar Oviedo (NC) will coordinate the 2010 symposium. The 2008 Future Trends in Animal Agriculture symposium provided a neutral and balanced forum for positive dialogue on animal welfare (AW) issues. The annual Animal Welfare Assessment Contest for students at Land Grant and other universities, held at Michigan State University, now includes components for veterinary students and for graduate students. The contest helps train students in AW and animal behavior areas, and emphasizes the importance of collaboration between disciplines and commodities to address AW issues. Bioethics are simply ethics as applied to biological systems, and are thus important in discussions of AW and animal rights issues. Discussions of bioethics help us understand value-driven societal perspectives, and restrictions or imperatives of animal use.

**Key Words:** Recognition Award, bioethics, animal welfare, assessment contest, extension workshop

**13 Improving broiler industry and university collaboration.** H. M. Engster\*, *Perdue Farms, Inc., Salisbury, MD.*

Progress made in the broiler industry in the last 50 years has been nothing short of amazing. Much of this progress can be attributed to the implementation by the industry of both basic and applied research in genetics, management, nutrition and health of the modern day broiler. This has taken students trained by universities, research conducted at universities and extension outreach to assist in the implementation of practical research. The need for well-trained expertise will only increase going forward. However, additional areas of focus will be needed in food safety, poultry welfare and behavior, environmental impact, meat quality and genomics in addition to the traditional performance metrics of weight gain, feed conversion and breast meat yield. Collaboration between industry and academia will be necessary for continued advancement, and could include permanent broiler industry advisory boards at universities and consistent participation of broiler industry professionals as invited college and graduate level lecturers. University professors and students need to continually be invited to tour industry facilities to ensure that their knowledge of industry practices is current and their research is relevant. Real-world solutions will be needed to meet the ever-increasing consumer needs beyond a quality product at a competitive price. A balance will need to be struck between industry and universities regarding the true value of proprietary intellectual property, its ownership and use. The increasing need for transparency in the industry will demand more detailed questions being answered about how our food is grown.

**Key Words:** broiler industry, university, collaboration

**14 University and turkey industry collaboration.** G. Engelke\*, *Cornerstone Resources LLC, New Brighton, MN.*

There are many words that describe the current relationships of the university system and the turkey industry. However, there are potentially few words to describe what the future will hold, those being: united we stand, divided we fall. The potential of how the turkey industry can fulfill the global needs for customer desired products is only limited by the boundaries that we place. First and foremost is that we need access to the best student talent. We cannot allow other disciplines to out maneuver us in signing the top students into our poultry science and animal science departments. To get these students, we need our most talented educators teaching and interacting with undergraduate and graduate students. For this to be accomplished, the system must provide the proper credit in evaluations for this critically important function. To achieve enhanced efficiencies in production, there needs to be greater focus on the horizon for two to three research projects in a combined discovery process of university and private enterprise. This needs to be supported through a combination of government funding

and industry support. The ownership of these technologies will need to be shared through equitable means. The deployment of best management practices and learning need to be a shared process between industry, allied industry, and university. Not all areas can and should be treated the same. There will need to be a realignment of resources that match the value that will be derived. The extension service cannot continue to serve two masters.

**Key Words:** university, industry, teaching, research, extension

**15 What is needed to improve university and industry collaboration: Comments from one egg industry representative.** H. R. Ball\*, *Michael Foods, Inc., Minnetonka, MN.*

Land Grant Universities (LGU) have a rich history of providing education, outreach, and research that enabled development of a highly productive, very technical, and efficient food production system in the United States. Early history shows close relationships between LGU and the agricultural community generating a large support base for the LGU. However, as rural demographics changed and modern agriculture/food systems have evolved to large regional/national based industries, the base of support for LGU agriculture departments has decreased. There is strong competition for federal and state support. Consequently, industry funding of research is critical for leveraging of long-term public support of LGU. In general, states with strong poultry industry segments have been able to maintain LGU departments with significant poultry focus. However those departments are, by structure and knowledge-base, capable of providing only a portion of the technically trained employees, outreach, and research needs required by poultry industries. Future collaboration between LGU and industry may of necessity focus on overcoming barriers to development of regional and nationally based centers of excellence with abilities to solicit and fund education and research from a broad range of specialties outside typical poultry-focused LGU departments. Looking ahead, there will also be social and politically driven challenges that may create small, dispersed producers that would benefit from traditional models of support from LGU. LGU agriculture departments will be challenged to maintain appropriate levels of effort and development of future faculty who can work collaboratively to develop and adopt emerging technology that sustains production of safe, economical, and quality food. Industry will need to find appropriate methods of supporting collective as well as proprietary information requirements. Industry associations may be the most appropriate vehicles for general support of federal and state resources as well as direct funding of identified research and training priorities.

**Key Words:** centers of excellence, collaboration, industry associations