Animal Sciences at Purdue - Poultry

Our Mission: Purdue Animal Sciences believes in empowering people with knowledge and solutions that transform lives.

Excellence in Learning
Undergraduate and graduate students gain a wealth of understanding issues facing the poultry industry in:

a) Midwest Poultry Consortium Center of Excellence (http://www.mwpoultry.org/). This two summer program for students offers six courses (Avian Physiology, Breeder Flock & Hatchery Management, Poultry Products Technology, Avian Health, Poultry Nutrition, and Poultry Enterprise Management). Dr. Hester teaches in the Avian Physiology course, while Dr. Applegate teaches and will be co-coordinator of the Poultry Nutrition course in 2014. The MPC links the students’ summer with an internship in the poultry industry. The courses and student scholarships are sponsored by the poultry industry throughout the Midwest. Since 2000, Purdue has sent an average of 5+ students/year (18% of students from the 13 state consortium)

b) Additional courses include: Commercial Poultry Management (Dr. Hester), Advanced Non-ruminant Nutrition (Dr. Adeola), and Avian Physiology (Drs. Hester and Asem (Basic Medical Sciences))

In recent years, at least 3 or more undergraduate students per year are beginning their professional careers with poultry companies in some facet of live production, including: field service/flock supervisors, operations associates, and hatchery manager. Graduate students (24 MS, 15 PhD, and 11 post-doctoral researchers, current or graduated since 2005). Over this time-frame, our graduate student/post-doctoral alum in poultry are working towards more advanced degrees or working in positions such as: faculty at other universities (6), research scientists at a research institutes, allied industries as technical or R&D directors, and poultry industry nutritionists.

Excellence in Discovery

Animal Efficiency
• Understand the factors affecting feedstuff evaluation for energy, phosphorus, & amino acids utilization & strategies to improve them
• Regulation of inflammation & its effect on efficiency of animal growth
• Modeling growth to refine nutrition, management, and selection to improve efficiency
• Strategies to cope with intestinal viscosity (an anti-nutritional factor in nutrient and energy absorption)
• Identify gene regulatory factors that control efficiency of nutrient metabolism for production and health

Animals and the Environment
• Strategies to reduce of phosphorus, nitrogen & NH₃ excretion by broilers, hens, turkeys & ducks
• Determine digestible phosphorus requirements of broilers, hens, turkeys, and ducks and determine digestibility of phosphorus & calcium in feeds
• Determination of the environmental footprint of poultry production with emphasis on reducing greenhouse gas emissions
• Determine contributions of diet and environment to endogenous (nutrient and energy) losses

Food Quality
• Control strategies of foodborne pathogens & antibiotic resistant bacteria in poultry & methods to limit transmission from farm-to-fork
• Metagenomic approaches to identify critical control points in foodborne pathogen transmission along the entire food production chain
• Prevention of early-life colonization with pathogens
• Strategies to promote of gastrointestinal health

Animal Well-Being
• Minimizing stress and pain in farm animals
• Humane methods of animal euthanasia
• Modifications of housing systems to improve animal welfare (e.g enrichments/enrichable cages for hens)
• Genetic selection programs designed to improve well-being are being tested & implemented with success in commercial poultry breeding programs
• Identify causes of and reduce lameness in birds
• Identify indicators of chronic pain, and methods to minimize stress and pain in poultry
• Understand animal behavior to optimize management strategies and animal welfare in commercial production systems
• Develop genomic methods to identify polymorphic alleles in genes associated with disease and behavior to improve disease resistance, livability and well-being in poultry
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Excellence in Engagement

- Leadership in Poultry Science Association (Dr. Hester – past president; Dr. Applegate – current 1st VP), a 1,400 person scientific society with 1/3 of its membership outside of the U.S.

- Chair of scientific advisory committee on animal well-being – United Egg Producers (Dr. Hester)

- Feed Management for Comprehensive Nutrient Management Plans (Dr. Applegate) development of training tools and certification for NRCS to offer payment incentives for dietary nutrient reductions throughout the US through an educational program and certification process. This collaboration (Purdue, Washington State Univ., Univ. of MO, and Univ. of NE) is currently developing a financial nutrient management software decision making tool – F$NMP

- Multi-State Poultry Health and Management Schools - Dr. Applegate, working with industry partners and faculty from Purdue, CA, MI, MN, & OH conducts training schools for the layer, broiler, and turkey industries.

- Multi-State Poultry Feeding and Nutrition Conference - Dr. Applegate co-coordinates this conference with faculty from IN, MI, IL, OH, & KY. This conference has gained an international reputation as one of the few conferences to focus on real-world poultry nutrition issues.

- Development of materials for an introductory poultry curriculum website for the regulatory community.

- Development of a National Digestible Amino Acid Roundtable and Working Group for the poultry industry.

- Dr. Applegate serves on the Coordinating Animal Nutrition Committee of the National Animal Nutrition Program - National Research Support Project (NRSP-9) of State Ag. Exp. Stations. As part of this committee, he collaborated with the National Research Council staff to host the first open discussion symposium critically evaluating nutrient requirement research in poultry since 1994 and global approaches to requirement research.

Future Plans

- Renovation of ½ of laying hen caging (circa early 1980s) from conventional caging with enriched/enrichable caging.

Who We Are (Poultry as primary species)

Dr. Layi Adeola, Professor. Monogastric nutrition (Broiler & duck). Research emphasizes amino acid nutrition, utilization of energy, and mineral utilization. The total program is aimed at improving the efficiency of lean meat production and minimizing nutrient impacts on the environment.

Dr. Todd Applegate, Professor & Extension Poultry Specialist. Laying hen, broiler, turkey, and duck nutrition and management. Research & extension efforts focus on minimizing nitrogen and phosphorus emissions from poultry operations, strategies to maximize nutrient use from feedstuffs, and ways to limit inflammatory costs to the digestive tract due to various stressors.

Dr. Heng-Wei Cheng, Adjunct Associate Professor, USDA-ARS. Laying hen and pullet well-being; neuroanatomy. Research studies the cellular and molecular mechanisms of stress-induced neuronal plasticity and behavioral adaptation and to develop neuroanatomical and neurophysiological quantitative indicators of animal well-being.

Dr. Patricia (Scotti) Hester, Professor. Laying hen, turkey physiology and well-being; bone growth. Research in poultry welfare is focused on osteoporosis in laying hens and impact of management and rearing on skeletal integrity.

Dr. Maja Makagon, Assistant Professor Animal Behavior/Well-Being. Research on how broilers, hens, and ducks perceive and interact with their environments, and implications these interactions have on management, well-being, and productivity in commercial settings. Recent focus on bird gait and lameness.

Dr. William (Bill) Muir, Professor. Population genetics (broilers and laying hens); behavior; transgenic risk assessment. Research consists of two major research thrusts: genetic methods to improve adaptability, stress resistance, and animal well-being; and the interface of quantitative and molecular genetics.