Extension and Instruction

83 Holistic vs. traditional teaching of complex aspects of avian physiology in a laboratory setting. S. Burgos*, *North Carolina State University*, *Raleigh*.

Biological concepts often carry a high degree of complexity, which increases explanatory difficulty. Although most students have previously encountered mammalian biology, an avian physiology course must ensure that, irrespective of their backgrounds, students develop a clear understanding of unique aspects of birds' body functions, and how these differ from their mammalian counterparts. The fact that many students have not previously been exposed to euthanasia and tissue dissection, adds to the challenge. The objective of this study was to compare the implementation of concrete multifaceted techniques for teaching complex aspects in avian physiology (PO-405), a North Carolina State University 4 credit-hour undergraduate course with a weekly 3h experimental laboratory. Forty-two students were registered for the course for fall semester 2005. Faced with an influx of students from diverse disciplines, limited laboratory equipment and space to house them, they were randomly distributed into two groups of twenty-one students as Group B and Group S. While both groups received the usual printed lab handouts and a short introductory explanation, Group S participants also received a comprehensive teaching model consisting of a short computer animated video of the metabolic process studied, a visual demonstration of the pertinent procedure, a printed sheet delineating each step to follow, an optional plastic chicken with its organs for orientation, and finally, a holistic explanation of how the laboratory session relates to the overall understanding of the course. After lab completion, identical assessments were placed, collected and graded by the instructor. Data was analyzed using proc GLM of the SAS Institute. Final laboratory scores were significantly higher ($p<0.05$) for holistically engaged students in Group S compared to Group B. Our simple comparative study suggests that comprehensive teaching with an emphasis on various learning styles results in better grades; probably leading to better understanding, and a more meaningful laboratory experience.

Key Words: teaching, avian, physiology

84 Monitoring the health status of California game fowl flocks. B. A. McCrea* and F. A. Bradley, *University of California*, *Davis*.

The Game Fowl Health Assurance (GFHA) Program was developed in 2003. Participating California game fowl producers voluntarily test their flocks for Avian Influenza (AI) and Exotic Newcastle Disease (END). Producers are sent swab kits and they collect pharyngeal and cloacal swabs from specified numbers of birds. Additionally, birds are periodically submitted to the California Animal Health and Food Safety (CAHFS) labs for testing. Swab kit results have been retained and reviewed since the inception of the program. CAHFS bird submission reports have yielded information on the prevalence of different disease-causing organisms in game fowl flocks throughout the state. Flock sizes ranged from 6 to 1000 birds, with an average flock size of 100 birds. A total of 31 counties was represented in the program. From October 2003 to March 2006, 25.0% (n=26) of swab kits were tested for END and 75.0% (n=78) were tested for both AI and END. The majority of swab kits (65.4%) have been submitted by producers from southern California. Swab kit testing was performed on 4,565 birds. No flocks in the program have tested positive for END or AI using pharyngeal or cloacal swabs as analyzed by PCR and confirmatory virus isolation. From October 2003 to March 2006, 95 birds were submitted to CAHFS as part of whole bird submissions. The majority (83.2%) of submissions occurred in 2004. A variety of disease-causing organisms have been recovered in birds submitted to CAHFS including *Mycoplasma sp.*, roundworms, tapeworms, *Eimeria* spp., Marek's Disease Virus, trichomonads, Fowl Pox Virus, *Gallibacterium anatis*, and lice. All whole bird submissions were negative for END and AI. Serological titers for Newcastle Disease Virus, Infectious Bronchitis Virus, Infectious Bursal Disease Virus, *Mycoplasma synoviae* and *Mycoplasma gallisepticum* were common. As part of this game fowl health promotion program, owners have been provided with flock health status information. Program organizers have used these results to develop future educational programs for this clientele group.

Key Words: game fowl, Exotic Newcastle Disease, Avian Influenza

85 Mississippi poultry nutrient management educational programming. J. Oldham and T. Chamblee*, *Mississippi State University*, *Mississippi State*.

Poultry production, the largest grossing agricultural enterprise in Mississippi, is concentrated in the south central region of the state. The location of the Mississippi poultry industry provided the impetus for educational programming detailing the management of non-point source nutrients and water resource quality in the region. In recent years, Mississippi State University Extension Service (MSU-ES) and Mississippi Agricultural and Forestry Experiment Station personnel have worked closely with all segments of the industry and other agencies to expand the research base and to provide training in nutrient management. Reorganization of MSU-ES in 2002 addressed the need for more non-traditional education programs in environmental issues in general, and nutrient management in particular. Facilitated discussions among attendees of the 2003 Mississippi Nutrient Management Symposium focused on the perceived strengths and weaknesses of the effort, and offered suggestions for improvement. The MSU-ES Environment/Nutrient Management Program Priority Group was organized to plan and implement programming efforts using multiple disciplines and university units. Recent changes in state CAFO permit requirements (2004) further increased the educational needs of poultry producers in nutrient management, record keeping, and other management skills. Mississippi requires annual continuing education for animal waste permit holders. MSU-ES, in conjunction with other agencies, facilitates and conducts continuing education programming for poultry producers.

Key Words: nutrient management

86 Poultry grower education program on current and future issues effecting the poultry industry. A. J. Pescatore*[1], M. G. Miller[2], K. D. Casey[3], R. S. Gates[4], and D. G. Overhults[4], [1]*University of Kentucky*, *Lexington*, [2]*Kentucky Poultry Federation/ Kentucky Egg Council*, *Lexington, Kentucky*, [3]*Texas Agricultural Experiment Station, Texas A&M University*, *Amarillo*, [4]*Department of Biosystems and Agricultural Engineering*, *Lexington, Kentucky*.

Numerous issues including biosecurity, avian influenza, air emission regulations, animal welfare and water quality have the potential to impact the profitability and sustainability of the commercial poultry

industry. Poultry growers hear or read conflicting sound bites and stories on these issues. An educational program was conducted to provide factual information on these topics to poultry producers. Ten local educational sessions were conducted for poultry producers and company support personnel from seven different poultry companies. In-depth discussions on the topics listed above were presented. Over five hundred producers have attended these programs. The attendees indicated that these programs improved their understanding of these issues. As a follow-up, a statewide one-day educational program for poultry growers was held that provided additional information on these issues. Funding for these educational efforts was provided by the Kentucky Department of Agriculture and the Kentucky Poultry Federation.

Key Words: grower education, issues education

87 The Egg and I: A training program and resource book for teachers and agents. A. J. Pescatore*[1] and M. G. Miller[2], [1]*University of Kentucky*, *Lexington*, [2]*Kentucky Poultry Federation/ Kentucky Egg Council*, *Lexington, Kentucky*.

In order to strengthen the youth programs in poultry a training workshop and resource manual was developed for teachers and extension agents. A focus group of six people that were representative of our target audience were invited to participate in an all day discussion on educational materials and activities. From this discussion a resource manual and program was developed. This program used the egg as the basis for providing information on nutrition, food safety, meal planning, science and agriculture. Educational resources and worksheets were developed. The workshops were designed to include a mixture of lectures, activities and hands-on demonstrations. The resource materials were distributed to 180 educators and extension professionals. The training was well received and the program has been implemented in numerous schools and county programs across the state. This program was developed in cooperation with the Kentucky Poultry Federation/Kentucky Egg Council with funding provided by a grant from the US Poultry and Egg Association.

Key Words: youth programs, 4-H, resource manual

Immunology

88 Major histocompatibility complex recombinant R13 antibody response against bovine red blood cells. N. G. Wilkinson[1], W. E. Briles[2], R. T. Kopulos[2], L. M. Yates[2], and R. L. Taylor, Jr.*[1], [1]*University of New Hampshire*, *Durham*, [2]*Northern Illinois University*, *DeKalb*.

Chicken major histocompatibility complex (MHC) genes include *B-F*, MHC class I; *B-L*, MHC class II; and *B-G*, MHC class IV. The genes are closely linked on chromosome 16 in the chicken genome. Recombinants between the MHC *B-F* and *B-G* regions have been useful to define genetic control of immune responses more precisely. Inbred Line UCD 003, (*B17B17*) is the genetic base for six congenic lines each containing a single unique MHC recombinant. These congenic lines have undergone ten backcrosses to Line UCD 003 and thus have 99.9% genetic uniformity. A new recombinant, designated *R13* (*BF17-BG23*), was found in a single male from the tenth BC generation for *R1* (*BF24-BG23*). The number of *R13* birds was increased through an additional backcross to Line UCD 003. This experiment tested the new recombinant for antibody production. A single *R13B17* male mated to five *R13B17* dams produced the experimental progeny segregating for *R13R13*, *R13B17*, and *B17B17* genotypes. At 4 weeks of age, all progeny were injected intravenously with 1 mL of 2.5% bovine RBC (BRBC) to induce a primary antibody response. Serum was collected from blood samples taken 7 days post-injection. Microtiter methods measured total and mercaptoethanol (ME)-resistant (IgG) antibodies against BRBC. Titers were expressed as the $\log_2$ of the reciprocal of the highest dilution giving visible agglutination. The same birds received another injection at 11 weeks of age to stimulate a secondary antibody response. All primary and secondary antibody titers against BRBC were evaluated by least squares ANOVA with hatch and *B* genotype as main effects. Fisher's Protected LSD at $P < 0.05$ separated significant means. Both primary and secondary total antibody titers ranked highest to lowest among *R13B17*, *B17B17*, and *R13R13* genotypes, respectively. No primary antibody titers differed significantly. However, the secondary total antibody titer of genotype *R13B17* was significantly higher than the titer of *R13R13* but not *B17B17*. ME-resistant antibodies did not differ significantly. The results suggest a complementary effect between *R13* and *B17* in the secondary antibody response.

Key Words: immunity, antibody, recombination

89 Identification and characterization of thymosin β4 in chicken macrophages. L. Kannan*[1,2], R. Liyanage[1], J. Lay[1], and N. Rath[2], [1]*University of Arkansas*, *Fayetteville*, [2]*USDA-ARS, Poultry Production and Product Safety Research Unit*, *Fayetteville, Arkansas*.

Molecular markers are important to understand the developmental, physiological, metabolic, and pathology-related changes in the cells and tissues. Low molecular weight proteins and peptides play pivotal roles in signal transduction and cellular regulation. To prospect for such markers we compared the differences between monocytes and granulocytes isolated from chicken peripheral blood. Using whole cell MALDI/TOF mass spectrometry in the mass range of 1-20 kDa, the results showed association of several minor and few major peaks with each population of cells. One major peak corresponding to mass 4963 was uniquely associated with monocytes but not with the granulocytes. To characterize 4963 we developed a purification procedure using reverse phase liquid chromatography and electrospray ionization mass spectrometry. We purified this peptide from the lysates of two transformed macrophage cell lines HD11 and HTC. Attempts to sequence this peptide using Edman degradation showed it to be N-terminally blocked. Trypsinization and peptide mass finger printing followed by MASCOT database search yielded it to be N-acetylated thymosin β4 (Tβ4). It was further confirmed by collision-induced dissociation. RT-PCR also showed the expression of Tβ4 mRNA by the macrophages. Though originally discovered in thymus gland, Tβ4