

continued for the 12-day induced molt. Positive control and vaccinated birds were challenged with  $1 \times 10^6$  CFU/mL/bird (15 days post vaccination) via oral gavage. SE colonization in the liver, spleen, ceca and ovaries was significantly ( $P < 0.05$ ) reduced in the E-beam SE vaccinated birds compared to the positive controls. E-beam technology can be customized to meet an integrators needs and can be extremely inexpensive since there is no need for R & D costs to develop the irradiation source or vaccine organisms. The results show that the immunological effects of this E-beam SE provided protection against SE colonization in laying hens during an induced molt.

**Key Words:** chicken, electron-beam, vaccination, *Salmonella*

**206 Evidence of Mx independent genetic resistance to viral infection.** M. D. Koci\*, R. A. Ali, M. D. Quiles, E. Strain, and C. M. Ashwell, *North Carolina State University, Raleigh.*

The ability of individual cells to detect and respond to the presence of virus is a critical first step in the body's ability to resist viral infection and disease. Much effort has focused on identifying proteins involved in the antiviral pathway. Several gene products have been described as part of the innate antiviral response, but our knowledge of how these proteins function or how polymorphisms in these genes affect the antiviral response is limited. In mammals, the Mx gene has been described

to have antiviral properties against various several virus families. Initial studies which identified the avian Mx homologue demonstrated it lacked antiviral activity. More recent studies have demonstrated that commercial and research lines of chickens have polymorphisms in their Mx gene. One variant in particular (G2032A) has been described to have antiviral activity. Sequencing of 12 unrelated individuals from each of 9 commercial layer lines lead to the identification of additional variants in the Mx gene. To begin to understand if the sequence polymorphisms in the Mx alleles are associated with antiviral activity, we isolated chicken embryo fibroblast (CEF) cells from commercial layers. Four CEF cell lines were produced (3, 6, 7, and 8) and genotyped for Mx and MHC I. These CEF cells were infected in vitro with an interferon sensitive virus (vesicular stomatitis virus) and assayed for resistance to virus infection. The results from these studies demonstrated two CEF lines with increased resistance (3 and 7) and two lines with decreased resistance (6 and 8). To further assess the role of Mx and MHC in viral resistance, genetic lines which produced CEF line 7 and line 8 were crossed, and resulting embryos were genotyped such that additional 11 CEF lines that provide each possible Mx and MHC combination were generated. Subsequent in vitro analysis of the crossed CEF cells demonstrated resistance to infection is not associated with Mx or MHC genotype. These results suggest that while some genotypes of Mx have been described to have antiviral activity, expression of the Ser631Asn is not sufficient to increase the innate resistance of CEF cells to viral infection.

**Key Words:** antiviral, innate immunity, Mx

## Extension and Instruction

**207 A survey of the economic, environmental, public policy and production issues facing the poultry industry in Louisiana.** T. A. Lavergne\*, S. M. Derouen, and G. M. Hay, *Louisiana State University AgCenter, Baton Rouge.*

A survey was conducted to determine the opinions of commercial producers, integrator representatives, allied industry representatives, regulatory personnel, and academic personnel concerning issues facing the poultry industry in Louisiana. Respondents were asked to rate 11 items within four categories of issues: Economic issues, Environmental issues, Public policy issues, and Production issues. The items were rated from 5 (extremely important) to 1 (not important). Of the 74 respondents, 45 were commercial growers, 12 were employed in the allied poultry industry, two were employed in the state's regulatory agency, six were academics, and nine were employed by integrator companies. The ratings of commercial poultry producers were similar to the average of the responses of all other categories of respondents. For economic issues, the ratings of commercial producers and all others ranged from 4.1 to 4.8 and 3.54 to 4.86, respectively. Rising input costs received the highest rating for economic issues. For environmental issues, the ratings of commercial producers and all others ranged from 3.3 to 4.4 and 3.0 to 4.5, respectively. Public perception of the environmental effects of animal agriculture received the highest rating for environmental issues. For public policy issues, the ratings of commercial producers and all others ranged from 3.5 to 4.5 and 3.3 to 4.5, respectively. Consumer confidence in food and animal product safety received the highest rating for public policy issues. For production issues, the ratings of commercial producers and all others ranged from 3.5 to 4.8 and 3.0 to 4.6, respectively. Improving production efficiency received the highest rating for production issues. All respondents rated each item as moderately, substantially, or extremely important. Economic issues received the most substantially important and higher ratings. The responses indicate that economic,

environmental, public policy, and production issues are important to these respondents involved in Louisiana's poultry industry.

**Key Words:** poultry, economic issues, environmental issues, public policy issues, production issues

**208 Multifacet, grower-driven education program.** M. Miller<sup>1</sup>, J. P. Jacob\*<sup>2</sup>, A. J. Pescatore<sup>2</sup>, D. G. Overhults<sup>3</sup>, and R. S. Gates<sup>4</sup>, <sup>1</sup>*Kentucky Poultry Federation, Winchester, KY*, <sup>2</sup>*University of Kentucky, Animal & Food Sciences, Lexington*, <sup>3</sup>*University of Kentucky, Biosystems & Agricultural Engineering, Lexington*, <sup>4</sup>*University of Illinois, Agricultural & Biological Engineering, Urbana.*

The Kentucky Poultry Federation received a grant from the KY Ag Development Board to support the state broiler industry. The project objective is to enhance the productivity and sustainability of KY poultry growers. The project is divided into 2 parts. In the 1st part energy audits are completed for a sample of poultry houses for each of the 6 integrators in the state. The objective of these audits is 2-fold. The 1st goal is to identify common areas where growers can improve energy efficiency by properly operating and maintaining existing equipment. The 2nd goal is to develop recommendations for cost effective upgrades that will help growers reduce their energy use. Information obtained from the audits is then used to develop complex-specific educational workshops for all their growers. The same information is used to develop an educational binder which is designed to serve as a reference book for the producers. The growers are kept up to date on the progress of this part of the project by means of a website and quarterly newsletter.

In the 2nd part of the project, a state-wide producer education conference is held each year and addresses current issues affecting all producers

in the state. In addition, 5 of the integrators each formed an 'Integrator Educational Advisory Committee' with membership from the company staff as well as representatives from the growers supplying the complex. These committees set their own educational goals and agenda for what they want to accomplish within the 2-yr time frame of the project. Each committee is provided funding for educational programs based on the priorities they have identified. In some cases this involves bringing in invited speakers on specific topics, but the committees are encouraged to 'think outside the box' and develop creative and unique educational programs that can benefit others in the community in addition to the poultry growers.

**Key Words:** broilers, extension, energy

## 209 Removed

**210 "ASPIRE" acquiring SAT preparation in rural education: An initiative designed to provide rural high school students with first-hand experience in the poultry industry while gaining SAT preparation necessary to gain college admission.** J. B. Hoffman\*, North Carolina State University, Raleigh.

The ASPIRE program is geared towards creating a partnership between the North Carolina Poultry Industry and rising high school juniors in order to provide students with summer internships in the industry while preparing them for the Scholastic Assessment Test (SAT) necessary to gain college admission. Many students residing in counties that are major broiler, turkey, and egg producers have a sincere interest in entering the poultry industry in the future. However, many of these students have not been successful in gaining admission to the Department of Poultry Science at North Carolina State University due to low SAT scores. Specifically, students living in the top poultry producing counties in North Carolina scored on average 200 points lower than the average SAT score of last year's entering freshman class at NCstate. In order to ensure the longevity of the industry, North Carolina State's Department of Poultry Science must graduate more students who are interested in entering the industry. Achieving this goal will be dependent upon increasing SAT scores of students interested in careers in the poultry industry so that they are successful in gaining admission to NCSU. With the participation of North Carolina's Poultry Industry, we are in the process of implementing a six week summer internship program for rising high school juniors. Students will intern at a poultry company's headquarters while participating in an SAT test preparatory class sponsored by their partner poultry company. By implementing the ASPIRE program, students interested in pursuing careers in the poultry industry will be able to begin forming relationships with leaders in the industry while improving their SAT scores and likelihood of college admission.

**Key Words:** SAT, college, admissions, poultry, industry

## Metabolism and Nutrition VI: Enzymes

**211 Thermostability and feeding effects of exogenous phytase on performance variables of 3-21 day old broilers.** S. A. Loop\*, L. K. Worley, C. K. Gehring, K. R. Beaman, and J. S. Moritz, West Virginia University, Morgantown.

Feed ingredient price and environmental regulations have dictated an increased incorporation of the feed enzyme phytase into broiler diet formulations. Most broilers consume pelleted feed that must be steam conditioned, extruded through a die, and dried. Phytase may be denatured due to exposure to heat and moisture. Phytase manufacturers have addressed this concern by using carbohydrate/lipid coatings, selecting phytase sources that are naturally heat stable, or genetic modification. Regardless, there is potential for heat stable phytase to survive the pelleting process but lose efficacy in liberating phytate bound phosphorus

*in vivo*. The objective of the current study was to demonstrate differences among an *in vitro* retention assay and *in vivo* feeding of nine different genetically modified, heat stable phytases. Dietary treatments consisted of positive and negative controls, as well as negative control diets including one of nine experimental phytases. All diets were pelleted at 71, 77, and 82°C. Feed samples were analyzed for phytase retention. The 77°C pellets were chosen for further evaluation due to all enzymes having high retention. The *in vivo* study consisted of male broilers being placed on a three day pretest, blocked by weight, and allocated to treatments in eight replicate raised wire cages. On day 21, birds were killed and right tibias were extracted for three point breaking force. Feed intake, feed conversion ratio, and live weight gain were calculated. Seven out of nine enzymes showed similar live weight gain to that of the positive control ( $P>0.05$ ). However, using contrasts, five