but adequate in Thr (0.86%); D2, adequate in Lys (1.24%) but deficient in Thr (0.46%); D3, adequate in Lys (1.24%) and Thr (0.86%). Diets 1 or 2 were progressively blended with diet 3 to derive the Lys or Thr dose-response diets, respectively. Incremental levels of Lys or Thr were made at a rate of 0.08%, for a total of 6 levels. A control diet containing surfeit amino acid levels was used to validate the titration diets for each experiment. All experimental diets were fed from 14 to 28 d of age in pellet form. Requirement estimates for the Lys dose-response study ranged from 1.04 to 1.08% when using the linear broken line model, and 1.07 to 1.11% when using the quadratic broken line model. The quadratic polynomial regression model was not significant for the Lys study, but was for the Thr dose response study, yielding a requirement estimate of 0.79% for BW gain. The linear broken line model resulted in Thr requirement estimates between 0.73 and 0.76% Thr. Only the linear broken line model resulted in simultaneous Lys and Thr requirement estimates for the same parameters, yielding Thr-to-Lys ratio values of 68 for BW gain and 70 for FCR.

Key Words: amino acid, lysine, threonine

32 Supplementing L-valine and L-isoleucine in low protein corn-soybean meal all-vegetable diets for broilers. J. Berres, S. L. Vieira*, A. K. Ferreira, R. Barros, P. X. Silva, and F. V. F. Furtado, *UFRGS, Porto Alegre, RS, Brazil*.

This study evaluated the live performance and meat yields of broilers fed increased Val:Lys and Ile:Lys from 14 to 35 d of age. One thousand eight hundred Cobb 500 male broilers were raised on the same feed and similar housing conditions to 14 d of age. A corn-soybean meal all vegetable feed with 1.1% digestible Lys was formulated w/o crude protein restriction to the fifth limiting AA. This diet was the negative control (T1 = 18.71% CP) and had the following AA to Lys ratios: SAA = 0.75; Thr = 0.65; Val = 70; Ile = 65. Val and Ile from synthetic sources were graded increased to this diet to generate the following treatments: T2) 0.75 Val and 0.65 Ile; T3) 0.80 Val and 0.65 Ile; T4) 0.70 Val and 0.68 Ile; T5) 0.70 Val and 0.71 Ile; T6) 0.75 Val and 0.68 Ile; T7) 0.80 Val and 0.71 Ile. A Positive Control (T8) with 1.1% digestible Lys formulated with CP = 20.37% minimum was also used. Each treatment had 9 replicates of 25 birds (8.9 birds/m^2). Body weight, feed intake and mortality were not different between treatments ($P > 0.05$). Weight gain from 14 to 35 d was positively affected by any level of L-Val and L-Ile, whereas feed conversion was improved only when the both AA were supplemented at the highest levels. No differences were found in terms of meat yields, but abdominal fat was reduced with the positive control. It is concluded that supplementing L-Val and L-Ile favored weight gain and feed conversion. It seems, however, that a greater amount of AA when birds are fed diets formulated with a minimum CP provide more consistent benefits in reducing abdominal fat.

Key Words: broiler, valine, isoleucine

33 Digestible lysine requirements and ideal amino acid ratios in diets for young (0–14 d) male broilers formulated to ideal ratios and balanced in amino acids. F. G. P. Costa*[2], Z. Wang[1], C. Coto[1], S. Cerrate[1], F. Yan[1], and P. W. Waldroup[1], [1]*University of Arkansas, Fayetteville*, [2]*Federal University of Paraiba, Areia-PB, Brazil*.

For many years, it has been suggested that diets with a "perfect balance" of amino acids with little excess protein will result in optimum performance of broilers. The objective of this study was to evaluate the need for digestible lysine in diets for the young (0-14 d) male broiler while maintaining a ratio of other amino acids to lysine. One series of diets used conventional amino acid supplements (Met, Lys, and Thr) to help meet amino acid needs while a second series of diets used additional amino acid supplements to have as many essential amino acids at the minimum level as possible. The ideal amino acid ratios suggested by Rostagno et al. (2005) were used as the basis for formulation. All diets were formulated to contain 1.14, 1.24, 1.34, 1.45, 1.55, and 1.65% digestible lysine with dietary ME level of 3,030 ME kcal/kg. In the first series of diets, minimum requirements were met for Lys, TSAA, Thr, and Val; in the second series minimum requirements for Gly+Ser, Arg, and Ile were also met. Diets with unconventional amino acid supplements ranged from 0.68 to 2.45% lower in crude protein than diets with conventional supplements. Twelve pens of 5 male chicks (Cobb 500) were fed each diet from 1 to 14 d of age. When diets were formulated using conventional amino acid supplements, increasing the level of digestible lysine while maintaining other amino acids in a fixed ratio resulted in improved growth and feed conversion. When nonconventional amino acids were used to minimize excess levels of essential amino acids, there was little or no response in body weight or improvement in feed conversion as the level of lysine and associated amino acids increased. These results suggest that some of the amino acid to lysine ratios may be underestimated with these amino acids becoming deficient when forced to their minimum suggested levels.

Key Words: broilers, lysine, ideal protein

National Extension Workshop

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

The activities and observations of the National Program Leader, Animal Production Systems, are reported. The 2008 Extension Special Recognition Award is presented to Jesse and Doris Lyons. Jesse provides exceptional leadership at the University of Missouri in youth, environmental protection, and extension programming, while Doris has made extensive contributions to the American Poultry Historical Society, and has several extension duties. Progress is being made in multi-state research committees: Agricultural Bioethics (NC_temp1902) was moved to the North Central Region; both Applied Animal Behavior and Welfare (NC1029), and Improvement of Poultry Air and Water Quality (S1035) are now full research committees. Portfolio reviews are yearly [Knowledge Area (KA) 306, Environmental Stress in Animals; KA308, Improved Animal Products (Before Harvest); KA315, Animal Welfare]. Project summaries submitted to the Current Research Information System (CRIS) are generally error free. The 2009 Southern Region (Quadrennial) Poultry Extension Workshop will be in Charlotte, NC, and the chair, Ken Anderson, requests ideas and volunteers. The 2008 National Poultry Waste Management Symposium will be in Des Moines, IA. Casey Ritz (GA), coordinator, encourages submission of

poster presentations and commercial exhibits. The 2008 Future Trends in Animal Agriculture symposium, the ninth since 2001, provides a neutral and balanced forum for opportunities to have positive dialog 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 will include a component for veterinary students. The contest is an opportunity to train students in AW and animal behavior areas, and emphasizes the importance of collaboration between disciplines to address AW issues. Bioethics is simply ethics as applied to biological systems, and are thus important in discussions of AW and rights issues. Discussions of bioethics help us understand societal perspectives on animal treatment, and the numerous factors that contribute to views of restrictions or imperatives of animal use.

Key Words: recognition award, animal welfare, bioethics

35 The role of professional societies in addressing bioethical issues. M. P. Lacy*, *University of Georgia*, *Athens*.

The use of animals in research and teaching continues to come under more and more scrutiny. The use of animals for food and even companionship has been questioned by some from an ethical perspective. Animal, dairy, and poultry scientists obviously are trained and most interested in the science of animals, their production, and use. We have left the discipline of ethics to philosophers. Bioethics is a complex, controversial, and polarizing subject. Its origins go back at least to the Nuremberg war crimes trial, but recent advances in human medicine including stem cell therapies, cloning, genetic screening, and so on have resulted in accentuated attention to this area. Although bioethics has primarily focused on research or medical treatment related to humans, some want to apply bioethics to any living organism that can sense pain or fear. Physicians have found it necessary to insert themselves into the debate regarding medical bioethics. Animal, dairy, and poultry scientists will have to make the same decision as to whether to venture into the debate regarding ethical use of animals. Doing so will be neither easy nor pleasant. Critics will claim we cannot be unbiased in such a debate, and it will be challenging to counter such arguments. Most of us believe the use of animals for research, instruction, food, and companionship is certainly ethical, and it is difficult for some of us to see another side to the debate. As I consider the future of our disciplines and industries, it appears the next generation of animal, dairy, and poultry scientists will have to be as well educated in ethics as in science. It will be important that these future scientists be trained and prepared to counter the argument that they are biased about the ethics of animal use simply because they are trained as animal, dairy, or poultry scientists. Professional societies will need to continue to strive to be involved in the bioethics debate and provide unbiased, science-based information just as they are involved today in controversial issues such as animal welfare, environmental protection, and food safety.

Key Words: bioethics, poultry scientists, professional societies

36 Future expectations of extension: A student's perspective. L. M. Stevenson*, *Auburn University*, *Auburn, AL*.

For extension to work with the generation that most students are in, it needs to be technologically advanced. Information must be readily available on the internet since this generation has grown up with technology and is used to having technology at their fingertips. It is second nature for these students to go to the internet for information rather than making a phone call to an office. Extension must have websites that are user friendly and explain important information clearly and concisely. Extension is a way to get information on the poultry industry out to the public. Students often do not know much about the role of extension. Extension work is often unseen by students in poultry science departments.

Key Words: students, extension

37 Future expectations of extension: A faculty member perspective. A. J. Pescatore*, *Department of Animal and Food Sciences, University of Kentucky*, *Lexington*.

The foundation of extension is to provide people with the knowledge and skills to make informed decisions that impact the quality of their life. In the beginning, the Cooperative Extension Service was the gatekeeper of information, and people attended extension programs to learn the latest information from the Ag College. Extension programs were viewed as social activities as much as educational opportunities. The gatekeeper role no longer exists, with information readily available from numerous sources. Our clientele have changed and will continue to change. They want instant access to information, are involved in more activities, have less time for new ones, and seem to have a shorter attention span. How we develop and deliver programs must account for these changes. The problems facing agriculture are more complex and the need for collaboration has never been greater, and will continue to increase. Extension's greatest strength is its ability to create teams or task forces to develop programs and solve problems. Extension has access to a diverse knowledge and expertise base and must effectively utilize this talent. Our clientele demand instant excess to information and extension must meet this expectation if it is to remain relevant. Land grant universities must continue to invest in their computer and communication infrastructure in order to fully meet our client needs. Technical support for this infrastructure and training for all extension professionals is essential to adopt new delivery methods. As we adopt new delivery methods we need to be careful that we do not lose contact with any segment of the population. Electronic communication presents extension great opportunities to expand our programs; however, we must remember there is no true substitution for personal contact. For extension to remain viable it must compete for resources and must be accountable to its clientele, stakeholders and advocates. As the competition increases for the limited resources, there will be a shift from being accountable to being justifiable. For extension to remain the reliable source of information it must be rapid, accessible, research based and above reproach.

Key Words: extension, program development, program delivery

38 Future expectations of extension: Administrative perspective. M. D. Ouart*, *University of Missouri*, *Columbia*.

Future expectations of extension will unfold in an environment of continued tight budgets characterized by near-level to dwindling appropriated funding yet increased programmatic demand. In response, this will require the following: 1) continued entrepreneurship of faculty and administrators in the areas of contracts, grants, fees, gifts, sponsorships,

and in-kind contributions, and 2) maintenance of appropriated funding and growth of competitive funding through program excellence characterized by relevance, reliability, and responsiveness. Program excellence will also require 1) focus on industry needs (e.g., issues-based programs such as animal welfare, food safety, waste management, and housing); 2) liaison work between industry and agencies/organizations with regulatory authority or interests; 3) strong 4-H Youth Development programs (including connections to undergraduate recruiting); and 4) focused efforts in the areas of small flocks, niche market production, game birds, and so on, as resources allow. Critical mass issues of 1) poultry graduates for industry and higher education needs; 2) faculty/staff for existing poultry science departments; and 3) faculty/staff in poultry science within animal sciences departments and other university units will remain areas of concern that will require continued, creative solutions and models to preserve strong extension education in poultry science.

Key Words: extension, administration, expectations

39 Youth and underserved audiences. F. A. Bradley*, *University of California*, *Davis*.

Poultry specialists are faced with staffing shortages and the challenge of working with nontraditional clientele groups. The number of poultry specialists and 4-H Youth Development advisors continues to decline. While studies have addressed maintaining 4-H enrollments, of equal, if not greater, issue is the recruitment of volunteer leaders. In 2006 a California Master 4-H Poultry Volunteer Program was initiated. Program candidates were selected from areas at significant distance from the poultry specialist. After intensive training sessions and the receipt of large personal libraries, the Master Volunteers are effectively organizing events, disseminating science-based information, and collaborating between counties. Frequent communication between the specialist and the Master Volunteers is keeping everyone enthusiastically engaged. Program delivery has significantly increased in areas where previously 4-H poultry participants had infrequent contact with the poultry specialist. California's Game Fowl Health Assurance Program (GFHAP) is directed at the state's game fowl breeders, including many of Hispanic and Asian descent. In general, most members of this clientele group do not have previous ties to Cooperative Extension or the University of California. Recruitment was an initial challenge that was addressed. Involving campus-based students from the Hispanic community aided outreach efforts. The GFHAP is constantly looking for ways to keep the game fowl breeders interested and fulfilling the Program requirements. Particularly successful have been contests and premiums for the first individuals to complete a required Program component. Those individuals are recognized with a special logo cap, their photograph in the GFHAP Newsletter, and so on. The premiums require a small monetary investment, but have resulted in increased participation from this very competitive clientele group. Extensionists deal not just with commodities, but with clients. Cooperative Extension (CE) has a strong tradition of effectively dealing with commodity issues. As CE moves forward, extensionists must find new ways to attract volunteers and underserved clients. Most importantly, once recruited, these individuals must be retained.

Key Words: Master 4-H Volunteers, game fowl

40 Panel: Extension in the past, present, and future. B: Production. G. P. Martin*, *Penn State University Extension*, *Lancaster*.

Since the Hatch act of 1887 the role of extension work has been to bridge the educational gap between discoveries at experiment stations and university laboratories with industry that may be far removed from such places by distance or time. In essence the role of extension was and still is based on "service" to the industry who is one of many stakeholders in the land-grant university system. By many methods of delivery, educational programs have been delivered to help bolster the field knowledgebase of industry and to assist in and partner with industry in new discoveries to solve issues facing it.

With discoveries in the areas of physiology, nutrition, genetics, medicine, food safety, welfare and engineering, extension educators helped train and advise the industry as the demand for meat and eggs grew during key years. As input costs began to rise, examination of the industry in a systems approach was necessary to determine least cost measures and a means toward profitability in shrinking market margins was achieved with help from key extension advisors reviewing the marketplace.

In its current role, extension is working as an information source for industry and is partnering with industry in continual field experimentation of methods of management to solve key issues facing the industry. Environmental controls, production methods for poultry market segments, disease controls, and nutrient management will continue to be at the forefront in many plans of work for extension educators.

The partnership of the extension educator to the husbandryman in the field has been a long one. The only way to sustain extension into the future is to remain relevant to the needs of our stakeholders. This means that extensionists will need to remain flexible to help answer the next "challenge" facing the industry. It may also involve explaining to other sectors of the stakeholder base (customers) how our food is produced. As new tools for educators evolve, we as our forefathers did, need to be early adopters to help stay current for inquiring minds in a hungry world.

Key Words: extension, education, industry

41 Poultry processing. P. A. Curtis*, *Auburn University*, *Auburn, AL*.

According to the National Chicken Council, in the 1800s and early 1900s, poultry production consisted of many households having backyard flocks of dual-purpose chickens. These chickens supplied eggs and an occasional chicken for Sunday or holiday dinner. By the 1930s, chicken meat production, previously a subsidiary of the egg industry, began with the development of the broiler. In the 1940s, feed mills, hatcheries, farms, and processors were all separate entities. Eventually entrepreneurs consolidated feed mill, hatchery and processing operations, resulting in the beginnings of the integrated industry. Chickens were typically sold "New York dressed," with only the blood and feathers removed. In 1942, the government approved "on-line" evisceration. By the 1960s, the commercial broiler industry began its economic boom. By 1952, specially bred meat chickens surpassed farm chickens as the number one source of chicken meat in the United States. "Vertical integration" took hold, with a single company involved in every stage of production, processing and marketing. Federal inspection of broilers became mandatory in 1959. In the late 1960s and early 1970s, major companies begin to market chickens under brand names. Today, 95 percent of broilers sold at retail grocery stores carry a brand name.

By the mid-1970s, the industry had evolved into its modern state with mechanization and automation technologies. By the early 1980s, consumers preferred cut-up and further-processed chickens to the traditional whole bird. Chicken surpassed pork consumption in 1985. Chicken consumption surpassed beef consumption in the United States in 1992. In 1998, USDA required the Hazard Analysis and Critical Control Point (HACCP) process control system program in all large poultry slaughter establishments. The HACCP regulation totally changed the way chicken was inspected. No longer did the inspectors tell the plant how they need to accomplish something, now the plants must decide the best way to produce a safe product and be able to prove scientifically that their process is valid. The role of the Extension specialist has had to change and will need to continue to change to meet the changing needs of the industry.

Key Words: processing, history, extension

Physiology, Endocrinology, and Reproduction: Physiology I

42 Effects of genetics, transport stress, and *Escherichia coli* challenge on hematology and clinical chemistry parameters of turkeys. G. R. Huff*[1], W. E. Huff[1], N. C. Rath[1], N. B. Anthony[2], and K. E. Nestor[3], [1]*USDA/ARS/PPPSRU*, *Fayetteville, AR*, [2]*University of Arkansas*, *Fayetteville*, [3]*The Ohio State University*, *Wooster*.

Males and females from 3 genetic lines of turkeys were compared for their response to an *Escherichia coli* airsac challenge followed by transport stress (Transport). The turkey lines were a slow growing line selected for increased egg production (Egg line), a fast growing line selected for increased 16 wk body weight (F line), and a commercial line (Comm line). Birds from each line were challenged at 14 wk with an air sac injection of 5,000 to 10,000 cfu of *E. coli* and were subjected to a transport stress procedure 8 d after the challenge that included a total of 12 h holding time in a transport vehicle. At the end of Transport birds were returned to their pens and provided with feed and water. The following morning all birds (n = 10 to19 birds/line) were bled, which was 1 d after the start of Transport and 9 d after challenge with *E. coli*. Whole blood was analyzed using the Cell-Dyn 3500 blood analysis system (Abbott Diagnostics) and serum chemistry was measured using the Express Plus analyzer (Ciba-Corning Diagnostics Corp). Transport decreased hematocrit, hemoglobin, mean cell volume, mean corpuscular hemoglobin, glucose, triglycerides, cholesterol, phosphorus, iron, albumin, and alkaline phosphatase (ALP) levels and increased uric acid, blood urea nitrogen, alanine aminotransferase, aspartate aminotransferase, and creatine kinase (CK). Line differences were variable, but the levels of both iron and ALP were indirectly correlated with growth rate. Iron and ALP were also the only parameters influenced by gender, with males having higher levels of both compared to females. CK levels were over 6-fold higher in transported Comm line birds and iron levels of transported Comm males were 3-fold lower than controls. Previously, the growth rate of these lines was positively correlated with increased heterophil to lymphocyte ratios and susceptibility to colibacillosis. The highly significant differences seen in the Comm line for these commonly measured blood parameters suggest that they may be useful for profiling flocks to determine their response to transport stress and feed withdrawal.

Key Words: turkeys, transport stress, clinical chemistry

43 Circadian expression of clock genes in the pineal gland, visual suprachiasmatic nucleus (vSCN) and premammillary nucleus (PMM) in photostimulated turkey hens. B. Leclerc*, S. Kang, C. Howell, L. Mauro, and M. E. El Halawani, *University of Minnesota*, *St. Paul*.

Dopamine-melatonin (DA-MEL) neurons in the PMM have previously been described to be light/dark-inducible at 14 hours after light on during the photosensitive phase. It is hypothesized that these PMM DA-MEL neurons may be a component of a biological clock involved in the reception of photoperiodic information critical for the regulation of seasonal reproduction in turkeys. To establish whether clock and melanopsin genes rhythms are related to the activation of these neurons, night interruption studies and circadian expression profile of these genes were conducted. In the first experiment, short day (6L:18D) birds were subjected to a light pulse of 30, 60 and 180 minutes duration at circadian times (CT) 8, 14, and 20. In the second experiment, short (8L:16D) and long day (16L:8D) birds were both sampled at CT1, CT5, CT9, CT13, CT17 and CT21. Brains were collected from each bird, the PMM and the vSCN were isolated using micropuncture technique and total RNA was extracted from nuclei and pineal glands. RT-PCR analysis was performed to determine the fold change in bmal1, clock, cry1, cry2, per2, per3, and melanopsin mRNA transcripts. In the night interruption study, our results suggest that 1 hour light stimulation induced ($P < 0.05$) per3 gene expression in the pineal and PMM, but repressed it ($P < 0.05$) in the vSCN. A similar trend was observed for bmal1 and cry1 genes in the vSCN and PMM. In the circadian profile study, pineal cry1 gene reached a nadir at CT21 and peaked at CT13 in the PMM, whereas melanopsin gene reached a zenith at CT21 and nadir at CT13 in the respective tissues. In the PMM, per2 gene peaked at CT5, whereas per3 gene was repressed at CT9. In the pineal and vSCN, both genes were positively related at CT1 and CT9-13, respectively. This study suggests that light is an effective entrainer of clock genes which are differently expressed in these neuronal targets.
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Key Words: gene expression, circadian rhythm, reproduction

44 Influences of maternal corticosterone and selection for divergent adrenocortical responsiveness to stress in Japanese quail on egg incubation length and hatchling body weight. J. B. Schmidt*, S. T. Treese, K. A. Davis, R. M. Andree, and D. G. Satterlee, *Louisiana State University Agricultural Center*, *Baton Rouge*.

While changes in corticosterone (B) during embryogenesis are thought to play a role in egg hatching, only a scant and controversial literature exists concerning the effects of in ovo (embryonic and maternally derived) B on the length of egg incubation (LEI) and chick body weight (BWT) at hatching. Because quail hens selected for exaggerated (high stress, HS) rather than reduced (low stress, LS) plasma B response to stress deposit more B into their eggs, these lines provide a good model to study the relationship between embryonic B and the above hatch variables. Therefore, we conducted studies that investigated the interactive effects of line (LS vs. HS) and maternal B treatment on LEI and hatchling