2003 Poultry Science Association Annual Meeting
Madison, WI
Monona Terrace
July 6 – 9, 2003

Opening Session
Sunday, July 6, 2003, 6:00 PM
Monona Terrace Ballroom B&C

Chair: Mary M. Beck, University of Nebraska-Lincoln
President, Poultry Science Association

Call to Order: Anthony Pescatore, University of Kentucky, First Vice President, Poultry Science Association

Words of Welcome:
Dr. Elton (Abe) Aberle, Dean of Agriculture, University of Wisconsin-Madison

Presidential Address: Mary M. Beck

Announcements and Instructions
Frank E. Robinson, University of Alberta, General Program Chair
SUNDAY, JULY 6, 2003

2003 PSA Informal Nutrition Symposium

Exploring the Gut and Dreaming about Opportunities
“In Honor of our Great Academic Advisors and Life Mentors”
Sunday, July 6, 2003
Ballroom A
University of Wisconsin
Madison, WI

Chair: Mamduh Sifri, ADM Animal Health and Nutrition

Dr. David H. Baker, University of Illinois
Dr. Jim D. Garlich, North Carolina State University
Dr. Robert Harms, University of Florida
Dr. Paul Harrison, University of Illinois
Dr. Alex Robblee, University of Alberta
Dr. Thomas W. Sullivan, University of Nebraska
Dr. Milton Sunde, University of Wisconsin
Dr. Sherman P. Touchburn, McGill University

Team Members: C. R. Angel, University of Maryland
                David F. Calabotta, ANH-Tech, Inc.
                Mark E. Cook, University of Wisconsin
                Wilhelm Guenter, University of Manitoba
                W. Wade Robey, Cargill, Inc.

1:00 The Advisor and The Mentor - Their Impact
Mamduh Sifri, ADM Animal Health and Nutrition

1:15 It is All in the Gut - The Digestive System: Challenges & Opportunities
Julia J. Dibner, Novus International, U.S.A.

2:10 Role of Mitochondria in the Phenotypic Expression of Feed Efficiency
Walter Bottje, University of Arkansas, U.S.A.

3:05 Antibodies - Alternatives to Antibiotics in Improving Growth
Ancillary Scientists
Symposium

The Avian Immune System: Function and Modulation
Sunday, July 6, 2003
8:00 AM – 5:00 PM
Room: Ballroom D

Chairs: Gisela F. Erf, University of Arkansas; Robert L. Taylor, Jr., University of New Hampshire

Abs. Time No.
8:00 Introduction
Gisela F. Erf, University of Arkansas
8:10 1 Proteomics in the chicken: tools for understanding immune responses to avian diseases. S. C. Burgess*, Mississippi State University, Mississippi State, MS.

Immune System Functions and Mechanisms

Abs. Time No.
9:00 2 Our current understanding of humoral immunity of poultry. T. R. Scott*, Clemson University.
9:30 3 Avian cell-mediated immunity. G. F. Erf*, University of Arkansas, Fayetteville, AR.
10:00 4 Participation of the intestinal epithelium and mast cells in local mucosal immune responses in commercial poultry. D. J.
Caldwell*, H. D. Danforth*, B. C. Morris*, K. A. Ameiss*, and A. P. McElroy*; Texas A&M University, College Station, TX; USDA/ARS/LPSI/PBEL, Beltsville, MD; Virginia Tech, Blacksburg, VA.

10:30 Break

**Genes Impacting Immune Responses**

<table>
<thead>
<tr>
<th>Time</th>
<th>No.</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>10:45</td>
<td>5</td>
<td>Distinctive polymorphism of chicken B-FI (class I MHC) molecules. Sandra Ewald* and Emily Livant, Auburn University, Auburn, AL U.S.A.</td>
</tr>
<tr>
<td>11:15</td>
<td>6</td>
<td>The genes of innate immunity on chicken chromosome 16. M. M. Miller*, Beckman Research Institute, City of Hope National Medical Center.</td>
</tr>
<tr>
<td>11:45</td>
<td>7</td>
<td>Non-MHC alloantigen genes affecting immunity. W. E. Briles*, Northern Illinois University, DeKalb, IL.</td>
</tr>
<tr>
<td>12:15</td>
<td>Lunch</td>
<td></td>
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**Systems for Understanding the Immune System Role in Disease Processes**

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<tr>
<th>Time</th>
<th>No.</th>
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<tbody>
<tr>
<td>1:30</td>
<td>8</td>
<td>Cytokine regulation of local host immune responses to Eimeria. H. Lillehoj*, USDA-ARS, Beltsville, MD.</td>
</tr>
<tr>
<td>2:00</td>
<td>9</td>
<td>Immune modulation of the pulmonary hypertensive response to bacterial lipopolysaccharide (LPS, endotoxin) in broilers. R. F. Wideman, Jr.* and M. E. Chapman, University of Arkansas, Fayetteville AR.</td>
</tr>
<tr>
<td>2:30</td>
<td>10</td>
<td>Major histocompatibility (B) complex control of responses against Rous sarcomas. R. L. Taylor, Jr.*, Department of Animal and Nutritional Sciences, University of New Hampshire, Durham, NH.</td>
</tr>
<tr>
<td>3:00</td>
<td>Break</td>
<td></td>
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Strategies for Improving Immune Responses against Disease

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<tr>
<th>Time</th>
<th>No.</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>3:15</td>
<td>11</td>
<td>Nutritional modulation of immune function in broilers. M. T. Kidd*, Mississippi State University, Mississippi State, MS.</td>
</tr>
<tr>
<td>4:15</td>
<td></td>
<td>Summation and Discussion</td>
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<tr>
<td></td>
<td></td>
<td>Robert L. Taylor, Jr., University of New Hampshire</td>
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</tbody>
</table>

National Extension Workshop

SUNDAY, JULY 6, 2003
9:30 AM - 4 PM

Chair: Richard Reynnells
Room: Hall of Ideas E&F

MODERATOR: Casey Ritz, University of Georgia

9:30 - 9:35 Welcome
Richard Klemme, Associate Dean and Administrator Cooperative Extension Service, University of Wisconsin

9:35 - 9:50 Washington Update
Richard Reynnells, NPL, Animal Production Systems, USDA/CSREES/PAS

9:50 - 10:10 Extension and Outreach of the Future
Ralph Stonerock, Akey, Inc.

10:10 - 10:40 Food Security Issues
Dr. Glauer, Ohio State University

10:40 - 11:45 Panel: Auditing and Certification Programs
1. Kay Johnson, Animal Agriculture Alliance, Arlington, VA
2. Gene Gregory, United Egg Producers
3. Jim Marion, National Chicken Council
4. Discussion

11:45 - 1:00 Extension Luncheon
MONDAY, JULY 7, 2003

**Environment and Management - Breeders and Incubation**

Monday, July 7, 2003
8:00 AM - 12:00 PM

Chair: E. David Peebles

Room: Ballroom C

<table>
<thead>
<tr>
<th>Time</th>
<th>No.</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>8:00</td>
<td>13</td>
<td>The impact of varying nutrient allocation from photostimulation on carcass and reproductive traits of conventional and high-yield broiler breeder females. R. A. Renema* and F. E. Robinson, University of Alberta, Edmonton, AB., Canada.</td>
</tr>
<tr>
<td>8:15</td>
<td>14</td>
<td>Effect of nutrient density and time of photostimulation on reproduction in fast- and slow-feathering turkey hens. V. R. Sikur*, F. E. Robinson¹, D. R. Korver², R. A. Renema¹, and M. J. Zuichhof³, ¹University of Alberta, ²Alberta Agriculture, Food and Rural Development.</td>
</tr>
<tr>
<td>8:30</td>
<td>15</td>
<td>Effect of broiler breeder age and dietary zinc source on chick characteristics and incubation requirements. B. P. Hudson*, B. D. Fairchild, W. A. Dozier, III, and J. L. Wilson, The University of Georgia, Athens, GA.</td>
</tr>
<tr>
<td>Time</td>
<td>Session</td>
<td>Title</td>
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<tr>
<td>8:45</td>
<td>16</td>
<td>Increased hatcher temperature adversely affects chick quality and survival during production whereas final body weights and processing yields are unaffected. N. S. Joseph* and E. T. Moran, Jr., Auburn University, Auburn, AL.</td>
</tr>
<tr>
<td>9:00</td>
<td>17</td>
<td>Effect of egg storage time and temperature on embryo development in broiler breeders. R. K. Bramwell*, K. R. Shaffer, and D. J. Donoghue, Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, Arkansas.</td>
</tr>
<tr>
<td>9:15</td>
<td>18</td>
<td>Effect of embryonic temperature during incubation on organ development in broilers. N. Leksrisomboong*, J. S. Swanner, and J. Brake, North Carolina State University, Raleigh, NC USA.</td>
</tr>
<tr>
<td>9:30</td>
<td>19</td>
<td>Effects of egg weight and location in incubator relative to fan on hatchability of broiler hatching eggs. O. Elibol¹ and J. Brake*,¹University of Ankara, Ankara, Turkey, ²North Carolina State University, Raleigh, NC USA.</td>
</tr>
<tr>
<td>9:45</td>
<td>20</td>
<td>Effects of embryonic temperature on hatchability and post-hatch performance of a high meat-yielding broiler strain. R. M. Hulet**,¹ E. Wheeler¹, W. B. Roush¹, M. Wineland¹, V. Christiansen**,¹ and A. McElroy*,¹Pennsylvania State University, ²North Carolina State University, ³Virginia Polytechnic Institute and State University.</td>
</tr>
<tr>
<td>10:00</td>
<td></td>
<td>Break</td>
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<tr>
<td>10:30</td>
<td>21</td>
<td>Transfer of antibiotics into the yolk sac of neonatal chicks: Potential adverse effect on competitive exclusion culture establishment. D. J. Donoghue*, P. J. Blore, and R. K. Bramwell, Department of Poultry Science, University of Arkansas, Fayetteville, AR.</td>
</tr>
<tr>
<td>10:45</td>
<td>22</td>
<td>Efficacy of boiling water immersion for collection of separate external and internal microbiological samples of breeder testes for Salmonella and Campylobacter spp. R. J. Buhr¹, J. S. Bailey¹, D. E. Osby**,¹ N. A. Cox¹, D. V. Bourassa¹, L. J. Richardson¹, and M. T. Musgrove¹,¹US Dept of Agriculture, ABS, Russell Research Center, Athens, Georgia, ²Dept of Poultry Science, University of Georgia, Athens, Georgia.</td>
</tr>
<tr>
<td>11:00</td>
<td>23</td>
<td>Effects of aeration and storage temperature on Campylobacter concentrations in chicken semen. K. Cole*, P. J. Blore¹, J. S. Holiman¹, A. M. Donoghue², M. T.</td>
</tr>
</tbody>
</table>
Musgrove', N. A. Cox', and D. J. Donoghue',  
'Department of Poultry Science, University  
of Arkansas, Fayetteville, AR 72701, 'USDA/  
ARS PPPSRU, Fayetteville, AR 72701, 'USDA/  
ARS PPMQRU, Russell Research Center, Ath-  
ens, GA 30605, 'USDA/ARS PMSRU, Russell  
Research Center, Athens, GA.

11:15  24  Broiler Breeder roosters’ ability to naturally  
mate after utilizing ultrasound as a non-de-  
structive means to measure testicular size.  
L. J. Richardson*, J. L. Wilson*, E. R. Bowl-  
ing*, A. B. Caudle*, and K. C. Powell*, 'Poul-  
try Science Department, University of Geor-  
gia, 'Veterinary Medicine, University of  
Georgia, *Roche Animal Nutrition and  
Health.

11:30  25  The optimum semen dilution for the Sperm  
Quality Index that is most predictive of fer-  
tility when inseminating with a constant  
volume of semen. H. M. Parker* and C. D.  
McDaniel, Mississippi State University.

11:45  26  Effect of organic selenium (Selplex®) and  
and male comb size on initial broiler breeder fer-  
tility. H. Romero-Sanchez*, P. Plumstead, B.  
A. Lenfestey, C. V. Williams, and J. Brake,  
North Carolina State University, Raleigh, NC  
USA.

**Immunology**  
Monday, July 7, 2003  
8:00 AM – 12:00 PM  
Chair: Hyun S. Lillehoj  
Room: Hall of Ideas I

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<th>Time</th>
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<tr>
<td>8:00</td>
<td>27</td>
<td>Determination of cytokine activity in crude and fractionated supernatants from the chicken Harderian gland. N. H. Noblet, M. D. Owens, A. B. Bodine, and T. R. Scott, Clemson University.</td>
</tr>
<tr>
<td>8:15</td>
<td>28</td>
<td>Structural and functional characterization of chicken interleukin-16 and interleukin-17 cDNAs. W. Min* and H. S. Lillehoj, USDA-ARS, Beltsville, MD, USA.</td>
</tr>
</tbody>
</table>
M. Klinman¹, and R. A. Heckert²,³Parasite Biology, Epidemiology and Systematics Laboratory, ANRI, USDA-ARS, Beltsville, MD, ²VA-MD Regional College of Veterinary Medicine, Univ. of Maryland, College Park, MD, ³Center for Food Safety and Applied Nutrition, FDA, Laurel, MD, ⁴Center for Biologics Evaluation and Research, FDA, Bethesda, MD, 20892.

8:45  30  Safety and efficacy of a coccidiosis vaccine delivered in ovo to commercial broilers. R. M. Poston¹, C. L. Heggen-Peay*², L. M. Charniga¹, A. Martin¹, G. R. Mathis³, and V. W. Doelling¹,²Embrex, Inc., ²Southern Poultry Research.

9:00  31  B complex and alloantigen system L effects on resistance and immunity to cecal coccidiosis. Z. O. Medarova¹, W. E. Briles², and R. L. Taylor, Jr.*¹,¹Department of Animal and Nutritional Sciences, University of New Hampshire, Durham, NH, ²Department of Biological Sciences, Northern Illinois University, DeKalb, IL.

9:15  32  Antibody response against sheep red blood cells in lines congenic for major histocompatibility B complex recombinant haplotypes. E. S. Schulten*¹, W. E. Briles², and R. L. Taylor, Jr.*¹,¹Department of Animal and Nutritional Sciences, University of New Hampshire, Durham, NH, ²Department of Biological Sciences, Northern Illinois University, DeKalb, IL.

9:30  33  Somatostatin and its receptor are expressed in the thymus of the chicken. Xiaodong Zhang* and Luc Berghman, Texas A&M University.

9:45  34  TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin) induces apoptosis-related gene expression in chicken B lymphocytes in vitro. N. Puebla-Osorio*¹, K. S. Ramos¹, J. J. Delrow¹, and L. R. Berghman¹,¹Poultry Science Department, Texas A&M University, College Station, TX, ²Center for Environmental and Rural Health, Texas A&M University, College Station, TX, ³Genomics Resource, Fred Hutchinson Cancer Research Center, Seattle, WA.

10:00 Break

10:30  35  CD14 and TLR4 expression on transformed T cell lines and interaction with macrophages in inducing iNOS activity. M. A. Qureshi*¹, R. A. Ali¹, and K. A. Schat¹,¹North Carolina State University, ²Cornell University.
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<tr>
<td>10:45</td>
<td>36</td>
<td>The role of macrophages in the pathogenesis of Marek’s Disease in chickens. R. C. Robbins*¹, R. A. Ali¹, K. A. Schat², and M. A. Qureshi¹.¹ NC State University, ²Cornell University.</td>
<td></td>
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<tr>
<td>11:00</td>
<td>37</td>
<td>Tissue fatty acid composition and immune response of broiler chickens fed diets containing conjugated linoleic or n-3 or n-6 polyunsaturated fatty acids. R. K Selvaraj*¹ and G. Cherian. Oregon State University, Corvallis, OR, USA.</td>
<td></td>
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<tr>
<td>11:45</td>
<td>40</td>
<td>Effect of dietary supplementation with bacterial cell powders prepared from Gram-positive and Gram-negative bacteria on lymphocyte profiles in broilers. G. F. Erf* and T. K. Bersi. University of Arkansas, Fayetteville, Arkansas, USA.</td>
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**Nutrition**

Monday, July 7

8:00 AM – 12:00 PM

Chair: Peter R. Ferket

Room: Ballroom A

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<tr>
<td>8:00</td>
<td>41</td>
<td>In ovo feeding increases glycogen content in the liver and muscle size in broiler hatchlings. Z. Uni*¹ and P.R. Ferket².¹ Department of Animal Sciences, Faculty of Agricultural, Food and Environmental Quality Sciences, Hebrew University of Jerusalem, Israel, ²Department of Poultry Science, College of Agriculture and Life Sciences, NCSU, Raleigh, NC.</td>
<td></td>
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</tbody>
</table>

8:45 44 Quantitative Computed Tomography as a tool for assessing bone quality in poultry. J. Saunders-Blades*, K. Nadeau, and D. Korver, University of Alberta, Edmonton, Canada.

9:00 45 Myonuclear apoptosis during early post-hatch starvation. J. J. Evans*, S. Pophal*, and P. E. Mozdziak*, North Carolina State University, UFGRS (CAPES) - Brazil.


9:45 48 Tissue accumulation of positive and negative isomers of gossypol in broilers fed diets supplemented with gossypol acetic acid. M. M. Lordelo*, A. J. Davis*, M. C. Calhoun*, and N. M. Dale*, University of Georgia, Texas A&M University.

10:00 Break

10:30 49 Effects of diet essential amino acid formulation and delivery on manure nutrient content in broiler chickens. L. R. Cooley* and H. L. Classen, University of Saskatchewan, Saskatoon, SK, Canada.

10:45 50 The energy cost of immune challenge. A. Beker*, S. Yadalam*, M. Daskiran*, S. L. Vanhooser*, and R. G. Teeter*, Department of Animal Science, Oklahoma State University, Oklahoma Animal Disease Diagnostic Laboratory, Oklahoma State University.

11:15  52  In vivo antioxidant properties of vitamin E and chromium in cold-stressed Japanese quails. N. Sahin1, K. Sahin*2, M. Onderci1, M. Ozcelik1, and M. O. Smith3, 1Veterinary Control and Research Institute of Ministry of Agriculture, 2Department of Animal Nutrition, Veterinary Faculty, University of Firat, Elazig, Turkey, 3Department of Animal Science, The University of Tennessee, Knoxville, Tennessee.

11:30  53  Effect of citric acid administration in the drinking water on performance, ileal microbial counts and growth characteristics of broiler chickens. J. Mahabadyani Nadaf*, M. Reza Akbari, and H. Kermanshahi, Ferdowsi University, Mashhad, Iran.

11:45  54  Effect of acetic acid administration in the drinking water on performance, growth characteristics, and ileal microflora of broiler chickens. M. Reza Akbari*, J. Mahabadyani Nadaf, and H. Kermanshahi, Ferdowsi University, Mashhad, Iran.

**Physiology**

Monday, July 7, 2003

8:00 AM – 11:15 AM

Chair: James Millam

Room: Hall of Ideas E&F

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<tr>
<td>8:00</td>
<td>55</td>
<td>Differences in skeletal muscle fibre growth in broiler and layer chickens: Association with myopathy? V. E. Cooke1, S. Gilpin2, M. Mahon2, D. A. Sandercock1, and M. A. Mitchell1, 1Roslin Institute (Edinburgh), Midlothian, UK, 2University of Manchester, Manchester, UK.</td>
</tr>
</tbody>
</table>
8:30  57  The involvement of erythropoiesis in the development of ascites in broiler chickens - the role of corticosterone and triiodothyronine. D. Luger and S. Yahav*, ARO The Volcani Center, Bet Dagan, Israel.

8:45  58  Relationship between glutathione and respiratory chain complex activities in duodenal mitochondria in broiler breeder males with low and high feed efficiency. C. Ojano-Dirain*, M. Iqbal', T. Wing', M. Cooper', and W. Bottje', 'Dept. of Poultry Science, Center of Excellence for Poultry Science, Univ. of Arkansas, Fayetteville, 2Cobb-Vantress Inc., Siloam Springs, AR.

9:00  59  Incubation temperature manipulation alters turkey muscle development. V. M. Maltby* and N. C. Stickland, The Royal Veterinary College, London, UK.


10:00  Break

10:30  63  Growth of broiler breeder males reared on a phytoestrogen-free diet using dried egg white as a source of protein. C. A. Pietsch*, J. B. Hess, R. J. Lien, and W. D. Berry, Auburn University, Auburn, AL/USA.


11:00  65  Age related changes in concentration of skin tissue pentosidine in the Ruffed grouse (Bonasa umbellus). J. A. Fallon*, R. L. Cochrane, and H. Klandorf, West Virginia University, Morgantown, WV/USA.
### Processing and Products - Meat Quality and Student Competition

- **Monday, July 7, 2003**
- **8:00 AM - 12:00 PM**
- **Chair:** Casey Owens
- **Room:** Hall of Ideas G

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<tr>
<td>8:00</td>
<td>66</td>
<td>Variation in broiler breast meat tenderness due to sample location.</td>
<td>R. K. Gundelly*, R. Xiong, J-F.C. Meullenet, and C. M. Owens, University of Arkansas, Fayetteville, AR.</td>
</tr>
<tr>
<td>9:00</td>
<td>70</td>
<td>Poultry collagen coatings as flavor protection for pet foods made with rendered poultry fat.</td>
<td>D. M. Greene*, K. M. Waterman, S. F. O’Keefe, C. Z. Alvarado?, and S. E. Duncan, VPI&amp;SU, Blacksburg, VA, USA, Texas Tech University, Lubbock, TX, USA.</td>
</tr>
<tr>
<td>9:15</td>
<td>71</td>
<td>Improving PSE and normal broiler breast meat quality with poultry collagen in a chunked and formed deli roll.</td>
<td>S. P. Daigle*, M. W. Schilling, C. Z. Alvarado?, and N. G. Marriott, VPI&amp;SU, Blacksburg, VA, USA, Texas Tech University, Lubbock, TX, USA.</td>
</tr>
<tr>
<td>9:45</td>
<td>73</td>
<td>Recovery of salmonellae post-chill and after storage for one week from TSP treated and control carcasses.</td>
<td>D. V. Bourassa*, D. L.</td>
</tr>
</tbody>
</table>
Fletcher¹, M. E. Berrang², R. J. Buhr², and J. A. Cason⁴,¹ The University of Georgia, Athens, GA, ²USDA-ARS Russell Research Center, Athens, GA.

10:00 Break

10:30 74 Effect of storage time on the growth of Salmonella Enteritidis in egg components. Z. R. Howard*,¹, R. W. Moore¹, I. B. Zabala-Diaz¹, K. L. Medvedev¹, M. M. Kundinger¹, S. G. Birkhold¹, S. C. Ricke¹, L. F. Kubena¹, J. A. Byrd², and D. J. Nisbet², Texas A&M University, Poultry Science Department, ²USDA Southern Plains Research Center.

10:45 75 The effects of storage time on vitelline membrane protein banding patterns and interior egg quality of eggs from molted hens. A. J. Kelley* and S. G. Birkhold, Texas A&M University, Dept of Poultry Science.


11:15 77 The survival of Salmonella typhimurium and psychrotrophic bacteria on commercial chicken breast meat treated with high energy electron beam irradiation and stored at 4°C for 14 days. K. C. Sarjeant¹, S. K. Williams*,¹, A. Hinton, Jr.², and G. E. Rodrick¹, University of Florida, ²Richard B. Russell Research Center, USDA ARS.

11:30 78 Modified atmosphere gas effects on bacterial growth at different depths in ground poultry meat. R. Dhanayajan, I. Han, J. Acton, and P. Dawson*, Clemson University.

11:45 79 Fillet L* from a broiler population: Correlations with preceding production-processing and changes to representative extremes after refrigeration and freeze-thaw. J. Galobart*, A. Corzo, and E. T. Moran, Jr, Poultry Science Department, Auburn University.
**Environment and Management - Meat Bird Production**

Monday, July 7, 2003  
1:00 PM – 3:30 PM  
Chair: Kevin Downs  
Room: Ballroom C

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<th>Authors</th>
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<tbody>
<tr>
<td>1:00</td>
<td>80</td>
<td>Influence of lighting program, light intensity and feed energy level on live performance, carcass fat and parts yields of female broilers.</td>
<td>R. J. Lien*, J. B. Hess', K. M. Downs', S. F. Bilgili', and W. A. Dozier III', Auburn University, Auburn, AL, Middle Tennessee State University, Murfreesboro, TN, University of Georgia, Athens, GA.</td>
</tr>
<tr>
<td>1:15</td>
<td>81</td>
<td>Lighting program effects on broiler performance and heat production.</td>
<td>A. Beker*, A. Beker', S. L. Vanhooser, and R. G. Teeter', Department of Animal Science, Oklahoma State University, Oklahoma Animal Disease Diagnostic Laboratory, Oklahoma State University.</td>
</tr>
<tr>
<td>1:45</td>
<td>83</td>
<td>Reduction of heat stress in broiler chickens exposed to high ambient air temperatures by means of convective cooling.</td>
<td>M. A. Mitchell*, P. J. Kettlewell', R. R. Hunter', and D. A. Sandercock', Roslin Institute, Roslin, Midlothian UK EH25 9PS, Silsoe Research Institute, Silsoe, Beds, UK.</td>
</tr>
<tr>
<td>2:00</td>
<td>84</td>
<td>Atmospheric oxygen level effects on performance and ascites incidence in broilers.</td>
<td>A. Beker*, S. L. Vanhooser', J. H. Swartzlander', and R. G. Teeter', Department of Animal Science, Oklahoma State University, Oklahoma Animal Disease Diagnostic Laboratory, Oklahoma State University.</td>
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<tr>
<td>Time</td>
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<tr>
<td>2:30</td>
<td>Response of turkey toms fed antibiotic-free diets supplemented with either Mannan Oligosaccharide (MOS) or Synermax™. R. M. Hulet<em>1 and T.L. Cravener</em>, Pennsylvania State University.</td>
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<tr>
<td>2:45</td>
<td>Measurement of annual litter production and nitrogen mass balance of broilers reared on rice hull litter. C. D. Coufal*, C. Chavez, P. L. Neimeyer, and J. B. Carey, Texas A&amp;M University, College Station, Texas.</td>
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<tr>
<td>3:00</td>
<td>Impact of dietary supplemental methionine sources on sensory measurement of odor related compounds in broiler excreta. C. Chavez<em>1, C. D. Coufal</em>, P. L. Neimeyer<em>1, J. B. Carey</em>1, R. E. Lacey<em>1, R. K. Miller</em>1, and R. C. Beier*2, Texas A&amp;M University, College Station, TX, USDA/ARS Southern Plains Research Center.</td>
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<tr>
<td>3:15</td>
<td>In-house composting of catastrophic poultry mortalities: An educational opportunity. G. W. Malone<em>1, N. T. Tablante</em>1, and L. E. Carr*1, University of Delaware, University of Maryland.</td>
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</table>

**Genetics**

Monday, July 7, 2003
1:30 PM - 4:45 PM
Chair: Nick Anthony
Room: Hall of Ideas I

<table>
<thead>
<tr>
<th>Abs. No.</th>
<th>Time</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>1:30</td>
<td>Effects of selection for increased breast yield on growth and performance of female Japanese quail. J. M. Reddish*, K. E. Nestor, and M. S. Lilburn, The Ohio State University/OARDC.</td>
</tr>
<tr>
<td>92</td>
<td>2:00</td>
<td>Effect of hypobaric hypoxia on ascites resistant and susceptible lines and their reciprocal F1 crosses. 2. Gut development. G.</td>
</tr>
</tbody>
</table>


2:30 94 Associations of BMP genes with skeletal integrity traits in chickens. H. Zhou*, N. Deeb†, A. Mitchell‡, C. Ashwell‡, and S. Lamont†, Iowa State University, U.S. Department of Agriculture.

2:45 95 Association of variant alleles of the uncoupling protein with feed efficiency in broiler chickens. P. M. Sharma*, W. G. Bottje, and R. Okimoto, University of Arkansas, Fayetteville, AR.

3:00 Break


3:45 97 Ring Lethal-2, an autosomal and recessive early embryonic failure in Coturnix quail. T. F. Savage, W. R. Colvin*, and J. C. Hermes, OR State University, Corvallis, OR.

4:00 98 Comparison of myosin heavy chain isoform transitions in poultry lines selected for breast yield, an unimproved line and White Leghorns. J. M. Reddish*, M. Wick, J. C. Sawdy, and M. S. Lilburn, The Ohio State University/OARDC.


4:30 100 Integrating the chicken classical linkage group II and the new consensus molecular map. D.M. Karcher* and J.J. Bitgood, University of Wisconsin – Madison.
## Nutrition - Feed Ingredient and Broiler Nutrition

Monday, July 7, 2003
1:00 PM - 3:30 PM

Chair: Bruce Boren
Room: Ballroom A

<table>
<thead>
<tr>
<th>Time</th>
<th>No.</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>1:00</td>
<td>101</td>
<td>Protein quality of poultry byproduct meal from whole fowl co-extruded with corn or wheat. O. C. Aimiuwu* and M. S. Lilburn, The Ohio State University, Columbus, Ohio.</td>
</tr>
<tr>
<td>1:15</td>
<td>102</td>
<td>The bioavailability of lysine in distiller’s dried grains plus solubles. B. S. Lumpkins*, A. B. Batal, and N. M. Dale, University of Georgia.</td>
</tr>
<tr>
<td>1:30</td>
<td>103</td>
<td>Potential of secondary protein nutrients as feed ingredient in broiler chick diets. Y. Sungwaraporn*, P. R. Renkert¹, and T. F. Middleton¹, North Carolina State University, Raleigh, NC, ¹AgPro Vision, LLC Kenansville, NC.</td>
</tr>
<tr>
<td>1:45</td>
<td>104</td>
<td>Palm kernel cake (PKC) as a substitute for maize and soybean meal (SBM) in pullet starter and grower diets. O. C. Aimiuwu¹ and J. M. Olomu², ¹Ohio State University, Columbus, Ohio, ²University of Benin, Benin City, Nigeria.</td>
</tr>
<tr>
<td>2:00</td>
<td>105</td>
<td>Comparative feeding values between dehulled and non-dehulled soybean meals assessed by broiler feeding trials and various in vitro methods. H. S. Lee¹, J. H. Choi², I. S. Shin¹, K. Y. Whang², and K. M. Chee², ¹American Soybean Association, Korea, ²Korea University.</td>
</tr>
<tr>
<td>2:15</td>
<td>106</td>
<td>Effect of feed form on lysine needs of broilers from 16 to 30 days of age. M. W. Greenwood*, K. R. Cramer¹, P. M. Clark², and R. S. Beyer¹, Animal Science and Industry-Kansas State University, ¹Grain Science and Industry-Kansas State University.</td>
</tr>
<tr>
<td>2:30</td>
<td>107</td>
<td>Effects of particle size and physical form of ration on performance of broiler chickens. C.A.A. López* and N. C. Baião, ¹Escola de Veterinária da UFMG, ²Escola de Veterinária da UFMG.</td>
</tr>
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</table>

3:00  109  Caloric value of pelleting and the consequential creation of nutritional dead zones. L. J. McKinney*1 and R. G. Teeter1, 'Department of Animal Science, Oklahoma State University.

3:15  110  Response of broilers fed graded levels of balanced dietary protein at three different levels of metabolizable energy to 21 days of age. P. W. Plumstead*, B. A. Lenfestey, H. Romero-Sanchez, and J. Brake, North Carolina State University, Raleigh, NC USA.

**Nutrition - Feed Additives**

Monday, July 7, 2003

1:00 PM – 3:30 PM

Chair: E. Nancy Fischer
Room: Ballroom D

<table>
<thead>
<tr>
<th>Time</th>
<th>No.</th>
<th>Title</th>
<th>Authors and Affiliations</th>
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<tr>
<td>1:00</td>
<td>111</td>
<td>Xanthophyll supplementation (lutein and canthaxanthin) may affect the broiler immune system and body composition within 9 days after test feed introduction. A. Mireles Jr.*, S. Kim, R. Thompson, E. Vasquez, and B. Amundsen, Foster Poultry Farms.</td>
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</table>
| 1:45  | 114  | Effect of β-Mannanase (Hemicell™) on turkey hen performance and flock uniformity at two energy levels differing by 150 kcal/kg ME in the absence of antibiotics. M. E. Jackson*, R. L. James', H. Y. Hsiao', and G.


2:30 117 Coccidiostat and/or antibiotic feed supplementation improve broiler performance and significantly affect body composition and the immune system. A. Mireles, Jr., S. Kim, E. Vasquez, and R. Thompson, Foster Poultry Farms.


3:00 119 The effect of feeding yolk antibody to phospholipase A₂ (aPLA₂) on growth and feed conversion in broiler chicks. M. Yang*, M. Cook, and K. Roberson, University of Wisconsin-Madison, Michigan State University.

Bone mineral density of laying hens housed in enriched versus conventional cages. M. N. Kopka*, H. W. Cheng*, and P. Y. Hester, Purdue University, Livestock Behavior Research Unit, West Lafayette, IN, USDA-ARS, West Lafayette, IN.

A comparison of bone densitometry in live birds with other bone tests using White Leghorns fed varying levels of dietary calcium. M. A. Schreiweis*, J. I. Ohm*, M. C. Ledur*, and P. Y. Hester*, Purdue University, W. Lafayette, IN, Southern University, Shreveport, LA, Embrapa Swine and Poultry Research Center, Concordia, SC, Brazil.

Osteocyte apoptosis in chicken radii following osteotomy. W. D. Clark*, E. L. Smith, K. A. Linn, J. R. Paul-Murphy, P. Muir, and M. E. Cook, University of Wisconsin, Madison, WI, USA.


Productive characteristics of laying hens through 60 weeks of age as affected by strain and by body weight and age at puberty. F. N. Madison*, L. G. Robeson, C. F. Toombs, D. F. Franco, H. Taira, M. Jalal, and M. M. Beck, University of Nebraska-Lincoln, Lincoln, Nebraska.

Inoculation of F-strain Mycoplasma gallisepticum at twelve weeks of age alters the effects of fasting on plasma protein and percentage serum LDL cholesterol concentrations in commercial laying hens. M. R. Burnham*, E. D. Peeples*, R. L. Walzem*, L. Branton*, and P. D. Gerard*, USDA-ARS, SPARC, Food and Feed Safety Research Unit, Mississippi State University, Texas A&M University, USDA-ARS, SCPRL.
**TUESDAY, July 8, 2003**

**Environment and Management — Enteric Bacteria**

Tuesday, July 8, 2003  
8:00 AM – 12:00 PM  
Chair: Andrew G. Yersin  
Room: Ballroom C

<table>
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<tr>
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<tr>
<td>8:00</td>
<td>127</td>
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<td>8:15</td>
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<td>8:30</td>
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<td>8:45</td>
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<tr>
<td>9:00</td>
<td>131</td>
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<th>Time</th>
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<td>8:00</td>
<td>127</td>
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**Abs.**

'Department of Poultry Science, University of Arkansas, Fayetteville, Arkansas, USDA/ARS PPPSRU Fayetteville, Arkansas, USDA/ARS FFRSU College Station, TX.

'Department of Poultry Science, University of Arkansas, Fayetteville, Arkansas, USDA/ARS PPPSRU, Fayetteville, Arkansas, USDA/ARS FFRSU, College Station, TX.

**Use of biofunctionalized nanoparticles to bind Campylobacter jejuni in poultry. J. L. Franklin*, B. W. Sheldon, J. L. Grimes, and M. J. Wineland, North Carolina State University.**


**Effect of Poultry Guard Litter Amendment (PGLA) on horizontal transmission of Salmonella enteritidis. J. L. Vicente**, G. Nava', S. E. Higgins', A. M. Donoghue', D. J. Donoghue', L. A. Newberry', and B. M. Hargis', Department of Poultry Science, University of Arkansas, USDA/ARS PPPSRU Fayetteville, Arkansas, USDA/ARS FFRSU College Station, TX.
Evaluation of environmental factors on the presence of *Salmonella* and *Campylobacter* at different sites through the broiler production continuum. J. A. Byrd*, R. H. Bailey*, R. W. Wills*, M. L. Rybolt*, L. F. Kubena*, and D. J. Nisbet*, USDA-ARS, SPARC, Food and Feed Safety Research Unit, College Station, TX., College of Veterinary Medicine, Mississippi State University.


The use of chicken IgY in a sandwich enzyme-linked immunosorbent assay for the detection of *Escherichia coli* O157:H7. H. H. Sunwoo*, M. S. Kang*, and J. S. Sim*, Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Canada, Department of Animal Biotechnology, Che Ju National University, Je-Ju Do, Korea.

Demonstrated effects of S6-strain Mycoplasma gallisepticum inoculation on hematocrit and serum calcium in two different flocks of commercial layers between 20 and 58 week of age. E. Y. Basenko*, E. D. Peebles¹, P. G. Gerard¹, S. L. Branton¹, and S. K. Whitmarsh¹, ¹Mississippi State University, Mississippi State, MS, ²USDA ARS, SCPRL, Mississippi State, MS.

A turkey model for evaluating the efficacy of adsorbents to ameliorate the toxic effects of aflatoxin. D. R. Ledoux¹*, J. N. Broomhead¹, Y. C. Chen¹, A. J. Bermudez¹, G. E. Rottinghaus¹, and W. W. Robey², ²University of Missouri, Columbia, MO, ³Cargill Feed Applications, Minnetonka, MN.

Incidence of breast blisters in turkeys and their effect upon meat quality. S. Kakarla*, H. D. Chapman, and C. M. Owens, University of Arkansas, Fayetteville, AR.

Nutrition - Nutrition A

Tuesday, July 8, 2003
8:00 AM – 11:45 AM
Chair: Craig Wyatt
Room: Ballroom A

8:00 141 Effect of dietary calcium on intestinal phytase activity and phytate-phosphorus utilization in Pekin ducklings. J. K. Rush¹*, R. Angel², K. M. Banks¹, K. L. Thompson¹, and T. J. Applegate¹, ¹Purdue University, ²Univ. of MD, College Park.


8:30 143 Effect of dietary available phosphorus and phytase in broiler breeders and dietary available phosphorus in broilers. C. V. Williams*, B. A. Lenfestey, and J. Brake, North Carolina State University, Raleigh, NC USA.

8:45 144 Modified phosphorus program for reducing excreta phosphorus levels based on commercial feeding intervals for broilers. C. Fritts* and P. W. Waldroup, University of Arkansas, Fayetteville AR.
9:00 145 A comparison of the efficacy of three phytase preparations in broiler chicks. E. M. Onyango*, M. R. Bedford†, and O. Adeola†, Purdue University, Zymetrics Inc.

9:15 146 Effects of citric and ascorbic acid as mineral chelators, and vitamin D₃ and calcium on efficacy of microbial phytase in a corn-soybean meal-based broiler starter diet. M. Afsharmanesh*, A. H. Samie*, and J. Pourreza†, Isfahan University of Technology, Isfahan, IRAN.

9:30 147 Content and bioavailability of phosphorus in distillers dried grains with solubles. C. M. Amezcua*, C. M. Parsons†, and S. L. Noll‡, University of Illinois, Urbana, IL, University of Minnesota, St. Paul, MN.


10:00 Break


10:45 150 Effect of fat type and enzyme supplementation on nutrient digestibility and broiler chicken performance. X. Meng*, B.A. Slominski, and W. Guenter, University of Manitoba, Winnipeg, Manitoba, Canada.

11:00 151 Live performance and meat yield responses of straight-run broilers to progressive concentrations of dietary energy maintained at a constant ME:Protein ratio. M. A. Hidalgo*, W. A. Dozier, III, A. J. Davis, and M. E. Freeman, University of Georgia.


11:30 153 Utilization of low crude protein diets fed to 0-3 wk broilers. S. E. Brooks*, H. M. Allen†, and J. D. Fiman†, University of Missouri-Columbia.
## Nutrition - Nutrition B

**Tuesday, July 8, 2003**  
8:00 AM – 12:00 PM  
Chair: Joseph B. Hess

**Room: Ballroom D**

<table>
<thead>
<tr>
<th>Time</th>
<th>No.</th>
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<th>Authors</th>
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<tbody>
<tr>
<td>8:00</td>
<td>154</td>
<td>Response of small broilers to feeds varying in nutrient density or the presence of a prestarter feed. J. B. Hess*, S. F. Bilgili¹, R. W. Gordon¹, T. J. Frost², and E. R. Miller³, ¹Auburn University, Auburn, AL, ²Gold Kist Inc., Atlanta, GA, ³Aviagen N.A., Albertville, AL.</td>
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<tr>
<td>8:15</td>
<td>155</td>
<td>Response of small broilers to feeds varying in nutrient density. J. B. Hess*, S. F. Bilgili¹, R. W. Gordon¹, and T. J. Frost², ¹Auburn University, Auburn, AL, ²Gold Kist, Atlanta, GA.</td>
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<tr>
<td>8:30</td>
<td>156</td>
<td>Reduced amino acid density feeding programs impact variability and performance of broilers. M. T. Kidd*, C. D. McDaniel¹, S. J. Barber¹, E. R. Miller², B. I. Fancher², and B. B. Boren², ¹Mississippi State University, Mississippi State, MS, ²Aviagen, Huntsville, AL.</td>
<td></td>
</tr>
<tr>
<td>8:45</td>
<td>157</td>
<td>Broiler utilization of vegetarian diets. S. L. Vieira*, I. L. Lima¹, C. A. Q. Borges¹, L. M. Fernandes¹, and V. R. Quadros¹, ¹Universidade Federal do Rio Grande do Sul, ²Perdigao Agroindustrial S/A - Brazil.</td>
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<tr>
<td>9:00</td>
<td>158</td>
<td>Metabolizable energy of soybean meal. N. M. Dale* and A. B. Batal, University of Georgia.</td>
<td></td>
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<tr>
<td>9:15</td>
<td>159</td>
<td>Amino acid digestibility in turkeys. M. S. Lilburn*, The Ohio State University.</td>
<td></td>
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<tr>
<td>9:30</td>
<td>160</td>
<td>Broiler chick utilization of threonine from fermentation by-product broth. W. A. Dozier, III*, E. T. Moran, Jr², and M. T. Kidd³, ¹The University of Georgia, ²Auburn University, ³Mississippi State University.</td>
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<tr>
<td>9:45</td>
<td>161</td>
<td>Source, level and age differences in fat utilization by broilers. L. P. Machado¹, S. L. Vieira¹, and V. R. Quadros¹, ¹Universidade Federal do Rio Grande do Sul, ²Avipal S/A - Brazil.</td>
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<tr>
<td>10:00</td>
<td></td>
<td>Break</td>
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10:45  163  Excess dietary lysine improves weight gain in niacin-deficient chicks. N. R. Augspurger* and D. H. Baker, University of Illinois at Urbana-Champaign.

11:00  164  Iodine toxicity in young chicks. T. M. Parr*, N. R. Augspurger, M. E. Persia, C. V. Delgado-Reyes, T. A. Garrow, and D. H. Baker, University of Illinois.

11:15  165  Effect of wet feeding wheat-based diets on broiler performance and nutrient retention. T. A. Scott*, Agriculture and Agri-Food Canada, Pacific Agri-Food Research Centre, PO Box 1000, Agassiz BC V0M 1A0.

11:30  166  Comparison of wheat bran phytase and a commercially available phytase on turkey tom performance and litter phosphorus content. K. D. Roberson*, T. J. Applegate, J. Kalbfleisch*, and W. Pan*, Michigan State University, East Lansing, MI, 'Purdue University, West Lafayette, IN.

11:45  167  Efficacy of phytase and citric acid for broiler chicks fed a phosphorus-deficient corn-soybean meal diets. M. Metwally*, Faculty of agriculture, Assiut University, Assiut, EGYPT.

Pathology
Tuesday, July 8, 2003
8:00 AM – 11:45 AM

Chair: G.B. Kulkarni
Room: Hall of Ideas I


9:00 172 Pathogenicity of proventricular homogenates containing IBDV. T.V. Dormitorio*, J.J. Giambrone, and F. J. Hoerr, Auburn University, Auburn AL, Alabama State Veterinary Diagnostic Laboratory, Auburn AL.

9:15 173 Determination of Salmonella host range of selected bacteriophages which exhibit increased host specificity. L. R. Bielke*, S. E. Higgins, K. L. Guenther, G. M. Nava, G. I. Tellez, D. J. Donoghue, A. M. Donoghue, and B. M. Hargis, University of Arkansas, USDA-ARS-PPRSU.


10:00 Break


11:00 178 Efficacy of bacitracin methylene disalicylate for prevention and control of necrotic enteritis and subsequent effects on carcass

11:30  180  Myopathies in broiler chickens: The roles of oxidative damage and vitamin E. D. A. Sandercock* and M. A. Mitchell, Roslin Institute, Midlothian, UK.

**Physiology - Reproduction**

Tuesday, July 8, 2003

8:00 AM – 10:45 AM

Chair: Wayne Kuenzel

Room: Hall of Ideas E&F

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<th>Time</th>
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<th>Authors</th>
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<tr>
<td>8:00</td>
<td>181</td>
<td>Effect of electrolytic lesions of the lateral septal organ on gonadal development in male broiler chicks (Gallus domesticus).</td>
<td>R. Thilakar* and W. Kuenzel, University of Arkansas, Fayetteville, AR.</td>
</tr>
<tr>
<td>8:15</td>
<td>182</td>
<td>Time-dependent c-fos expression as a neuronal activation marker following electrical stimulation in the turkey hypothalamus.</td>
<td>S. W. Kang*, O. M. Youngren, and M. E. El Halawani, University of Minnesota, St. Paul, MN, USA.</td>
</tr>
<tr>
<td>8:30</td>
<td>183</td>
<td>WITHDRAWN</td>
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<tr>
<td>8:45</td>
<td>184</td>
<td>Coexpression of dopamine or vasoactive intestinal peptide receptors with prolactin in the turkey pituitary.</td>
<td>Y. Chaiseha<em>1, O. M. Youngren</em>, and M. E. El Halawani1,2, School of Biology, Institute of Science, Suranaree University of Technology, Thailand, 2Department of Animal Science, University of Minnesota, St. Paul, MN.</td>
</tr>
<tr>
<td>9:00</td>
<td>185</td>
<td>Tyrosine hydroxylase mRNA expression in the turkey hypothalamus.</td>
<td>A. Thayananuphat*, S. W. Kang, K. Al-Zailaie, O. M. Youngren, and M. E. El Halawani, Department of Animal Science, University of Minnesota, St. Paul, MN.</td>
</tr>
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</table>

9:30 187 Genetic selection for growth, egg production or other traits; the resulting patterns of sperm penetration of the perivitelline layer at the germinal disc. R. K. Bramwell*, Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, Arkansas.

9:45 188 A novel method for improving the fertility of glycerol-exposed poultry semen. J. Long* and G. Kulkarni¹,¹BGL, ANRI, BARC, ARS, USDA, ²ADOL, USDA.

10:00 Break

10:30 189 Light-induced reduction of cytoplasmic free calcium in neurons proposed to be encephalic photoreceptors (EPRs) in chick brain. H. Li*,²M. Ferrari, and W. Kuenzel,¹University of Arkansas at Fayetteville, ²University of Missouri at Kansas City.

WPSA Invited Lecture

Sponsored by the USA and Canadian Branches of the World’s Poultry Science Association

1:00 PM - 2:00 PM

Ballroom A

Problems with accurately defining the nutrient requirements of heat-stressed poultry. Dr. Derick Balnave, University of Sydney-Camden, Australia

PSA Business Meeting

Tuesday, July 8

2:15 PM - 4:00 PM

Ballroom A
WEDNESDAY, July 9, 2003

Environment and Management – Layers & Gamebirds

Wednesday, July 9, 2003
8:30 AM – 11:45 AM
Chair: John P. Blake
Room: Ballroom C

<table>
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<th>Time</th>
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<tr>
<td>8:30</td>
<td>190</td>
<td>Early brooding temperature considerations for bobwhite quail.</td>
<td>J. P. Blake*, J. B. Hess, W. D. Berry, and N. W. Thornhill, Auburn University, AL.</td>
</tr>
<tr>
<td>8:45</td>
<td>191</td>
<td>Changes in protein level for bobwhite quail.</td>
<td>J. P. Blake*, J. B. Hess, and B. D. Bowers, Auburn University, AL.</td>
</tr>
<tr>
<td>9:00</td>
<td>192</td>
<td>The effects of feeding different dietary formulations on growth criteria in ring necked pheasants.</td>
<td>G. S. Davis*, K. E. Anderson', C. R. Parkhurst', and L. R. Minear, North Carolina State University, Raleigh, NC/USA, Southern States Cooperative, Richmond, VA/USA.</td>
</tr>
<tr>
<td>9:15</td>
<td>193</td>
<td>The second cycle behavioral response and fearfulness of commercial laying hen strains to alternative molting programs.</td>
<td>K. E. Anderson* and D. Joyce, North Carolina State University, Raleigh, NC, North Carolina Department of Agriculture and Consumer Services, Salisbury, NC.</td>
</tr>
<tr>
<td>9:30</td>
<td>194</td>
<td>Second cycle production and mortality response of commercial laying hen strains to alternative molting programs.</td>
<td>K. E. Anderson*, L. R. Minear*, and D. Joyce, North Carolina State University, Raleigh, NC, Southern States Cooperative, Richmond, VA, North Carolina Department of Agriculture and Consumer Services, Salisbury, NC.</td>
</tr>
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</table>
10:00  Break

10:30  196 Feeding high levels of whole wheat in combination with mash or pelleted diets to laying hens. K. Schwean-Lardner*, H. L. Classen¹, and C. D. Bennett², University of Saskatchewan, ‘Manitoba Agriculture and Food.

10:45  197 Feeding high levels of whole wheat in combination with mash or pelleted diets to laying hens II. K. Schwean-Lardner*, H. L. Classen¹, and C. D. Bennett², University of Saskatchewan, ‘Manitoba Agriculture and Food.

11:00  198 Development of successful alternative induced molting programs for commercial layers. J. Brake*, North Carolina State University, Raleigh, NC USA.

11:15  199 Globalizing a senior level poultry production course. J. D. Firman*, University of Missouri.


**Genetics II**

Wednesday, July 9, 2003

9:00 AM – 11:30 AM

Chair: David Harry

Room: Hall of Ideas I

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## Nutrition

**Wednesday, July 9, 2003**

8:30 AM – 11:30 AM

**Chair:** Robert Elkin

**Room:** Ballroom A

<table>
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<th>Time</th>
<th>No.</th>
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<tr>
<td>8:30</td>
<td>209</td>
<td>Comparison of traditional fasting molt versus non-fasting low density, low sodium molt diets and the requirement for cystine during molt and post-molt. L. F. LaBrash* and S. Scheideler, University of Nebraska-Lincoln.</td>
</tr>
<tr>
<td>9:00</td>
<td>211</td>
<td>Effect of several levels of Peniophora lycii phytase on nutrient utilization in laying hens. S. Gomez*, C. Mojica*, and S. R.</td>
</tr>
</tbody>
</table>
Fernandez*), 1Mexico Agriculture Research Institute, 2Roche Vitaminas Mexico, 3Roche Vitamins Inc.

9:15  212 Effects of dietary selenium source on egg production, fertility, hatchability, and shell quality of broiler breeders. R. A. Renema*, University of Alberta, Edmonton, AB., Canada.


9:45  214 Use of distillers grains with solubles in growing-finishing diets for turkey hens. K.D. Roberson*, Michigan State University.

10:00 Break

10:30  215 Retention of bicarbonate infused into broiler breeder hens. R. A. Coleman*, A Hassanabadi, M. A. Leslie', S Moehn', R. O. Ball', and D. R. Korver, 1University of Alberta, Canada, 2University of Mashhad, Iran.

10:45  216 The egg is refractory to soy sterol enrichment through alteration of the hen's diet. R. G. Elkin* and E. S. Lorenz, The Pennsylvania State University, University Park, PA.

11:00  217 Differential effects of conjugated linoleic, n-6 or n-3 polyunsaturated fatty acids on hepatic lipid characteristics and histopathology of laying hens. Gita Cherian* and Mary P. Goeger, Department of Animal Sciences, Oregon State University, Corvallis, Oregon, 97331-6702.

11:15  218 The effect of various levels of conjugated linoleic acid on chicken egg yolk fatty acid content and hatchability. R. Aydin*, E. Ozsan, and M. E. Cook, 1Kahramanmaras Sutcuimam University, Turkey, 2Kahramanmaras Sutcuimam University, Turkey, 3University of Wisconsin Madison, USA.
Processing and Products - Egg Microbiology

Wednesday, July 9, 2003

9:00 AM - 11:45 AM

Chair: Patricia Curtis

Room: Hall of Ideas G

<table>
<thead>
<tr>
<th>Time</th>
<th>No.</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00</td>
<td>219</td>
<td>National Egg Temperature Survey: 1. Production. P. H. Patterson*, K. W. Koelkebeck, K. E. Anderson, M. J. Darre, J. B. Carey, D. U. Ahn, R. A. Ernst, D. R. Kuney, and D. R. Jones. 1 Penn State University, University Park, PA, 2 University of Illinois, Urbana, IL, 3 North Carolina State University, Raleigh, NC, 4 University of Connecticut, Storrs, CT, 5 Texas A&amp;M University, College Station, TX.</td>
</tr>
<tr>
<td>9:30</td>
<td>221</td>
<td>External and internal microbial contamination of shell eggs during extended storage. D. R. Jones*, M. T. Musgrove, and J. K. Northcutt, Russell Research Center, USDA-ARS, Athens, Georgia.</td>
</tr>
<tr>
<td>10:00</td>
<td></td>
<td>Break</td>
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<tr>
<td>10:45</td>
<td>225</td>
<td>Effect of elevated incubation temperature (42° C) on the multiplication and rapid detection of Salmonella enteritidis in egg contents pools. Richard K. Gast* and Peter S. Holt, USDA-ARS, Southeast Poultry Research Laboratory.</td>
</tr>
</tbody>
</table>
11:00 226 Multiple rinses of eggshells for recovery of aerobes and enterobacteriaceae. M. T. Musgrove*, D. R. Jones, J. K. Northcutt, and M. A. Harrison, USDA-ARS, University of Georgia.

11:15 227 Airborne microorganisms in shell egg processing facilities. J. K. Northcutt*, D. R. Jones, K. D. Ingram, and A. Hinton, Jr., USDA-ARS, Russell Research Center, Athens, GA.

### Avian Osteoporosis: Measurement and Ethical Consideration

Wednesday, July 9, 2003
1:00 PM – 4:00 PM

**Chair:** Doug Korver, University of Alberta

**Room:** Ballroom A

<table>
<thead>
<tr>
<th>Time</th>
<th>No.</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>1:00</td>
<td>Wel</td>
<td>Welcome and Introduction, Doug Korver, University of Alberta</td>
</tr>
<tr>
<td>1:05</td>
<td>228</td>
<td>Welfare implications of avian osteoporosis. A. B. Webster*, The University of Georgia, Athens, GA.</td>
</tr>
<tr>
<td>1:35</td>
<td>229</td>
<td>Overview of bone biology in the egg-laying hen. C. C. Whitehead*, Roslin Institute, Edinburgh, Midlothian, UK.</td>
</tr>
<tr>
<td>2:00</td>
<td>230</td>
<td>Role of estrogen in avian osteoporosis. M. M. Beck* and K. K. Hansen, University of Nebraska-Lincoln, Lincoln, NE, University of Nebraska Medical Center, Omaha, NE.</td>
</tr>
<tr>
<td>3:35</td>
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<td>Panel Discussion</td>
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</table>
Bioethical Symposium

Wednesday, July 9, 2003
1:00 PM - 4:00 PM

Chair: Rich Reynells, USDA/CSREES/PAS
Room: Ballroom C
Moderator: Casey Ritz, University of Georgia

<table>
<thead>
<tr>
<th>Time</th>
<th>No.</th>
<th>Title</th>
<th>Presenter &amp; Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00</td>
<td></td>
<td>Welcome, Tony Pescatore, University of Kentucky</td>
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<tr>
<td>2:05</td>
<td>234</td>
<td>Introduction, Richard Reynells, USDA/CSREES/PAS</td>
<td></td>
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<tr>
<td>2:15</td>
<td></td>
<td>WCC-204 Goals and Why it is Important to the Future of Animal Production Systems, Debbie Cherney, Cornell University</td>
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<tr>
<td>2:45</td>
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<td>Defining a Middle Ground for Philosophers and Production: Bio-ethics, Steve Davis, University of Oregon</td>
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<tr>
<td>3:15</td>
<td>235</td>
<td>Development of Contemporary Issues Courses: Pitfalls and Opportunities, Fred Stephens, Ohio State University</td>
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<tr>
<td>3:45</td>
<td></td>
<td>Ethical Issues of Global Corporatization: Agriculture and Beyond, David Pimental, Cornell University</td>
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<tr>
<td>4:15</td>
<td></td>
<td>Discussion</td>
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</tbody>
</table>
**POSTERS**

Monday, July 7  
4:00 PM – 6:00 PM  
Exhibit Hall B

**Environment and Management**

**Abs. No.**


240 The effect of diet and age of photostimulation on the skeletal integrity and long term productivity of SCWL hens. M. A. Martinez-Cummer* and S. Leeson, University of Guelph, Guelph, Ontario, Canada.


Performance verification of candidate environmentally superior technologies. C. M. Williams*, North Carolina State University, Raleigh, NC/USA.

Application of plating enumerations and denaturing gradient gel electrophoresis to study turkey poult gastrointestinal tract bacterial diversity. T. Wiard*, M. King, and T. Rehberger, Agtech Products, Inc., Waukesha, WI.

Efficacy of KEM SAN™ liquid acidifier and other water sanitizers against select poultry and food pathogens. P. A. Welch*, M. Burke, T. George, D. Sanders, J. K. Murphy, and V. J. H. Sewalt, Kemin Americas, Inc.


Housing effect on behavior and production performance of laying hens: furnished cages vs. conventional cages. K. Pohle* and H. Cheng, Purdue University – West Lafayette, Indiana.


Growth and development of broiler breeder males reared to early maturation. C. A. Pietsch*, J. B. Hess, R. J. Lien, and W. D. Berry, Auburn University.

Study of different materials for making evaporative plates and their effects on thermal comfort atmosphere of acclimatized poultry houses with systems of negative tunnel ventilation. M. Oliveira de Paula, I. Ferreira Tinoco*, C. Elias da Silva, and J. Nogueira da Silva, Department of Agricultural Engineering, University of Vicoso, Brazil.

The influence of lining to thermal comfort in covering of ceramic tiles, asbestos clay and aluminum used in poultry houses in Brazil’s winter conditions. Marcos Oliveira de Paula, Rodrigo Couto Santos, and Ilda Ferreira Tinoco*, Department of Agricultural Engineering, University of Vicoso, Brazil.

The impact of Sal CURB® ASF liquid antimicrobial on the performance of commercial phytase products. A. Lamptey and V. J. H. Sewalt*, Kemin Americas, Inc., Des Moines, Iowa, USA.

Composition of poultry litter through laboratory analysis and in-house nutrient profiling for nutrient management plan development. C. W. Ritz*, A. S. Tasistro, D. E. Kissel, and P. B. Bush, University of Georgia, Athens, GA.
Extension and Instruction

Abs.
No. 254 A poultry industry manager survey used to characterize employable skills for undergraduate students. K. M. Downs* and J. E. Mehlhorn, Middle Tennessee State University.

Abs.
No. 255 An undergraduate laboratory course on animal cell culture techniques. P. E. Mozdziak*, North Carolina State University, Raleigh NC.

Genetics

Abs.
No. 256 Functional analysis of Salmonella genome for virulence genes using transposon sequence tag profiles. M. M. Cox1, R. L. Zippin2, L. F. Kubena1, D. J. Nisbet2, S. C. Ricke1, and Y. M. Kwon1,1University of Arkansas, Fayetteville, AR, 2USDA-ARS, College Station, TX, 3Texas A&M University, College Station, TX.

Abs.
No. 257 Relationship between PGC concentration and morphological parameters in early chick embryos. C. Tomita, K. Nomura, and A. Tajima*, Institute of Agriculture and Forestry, University of Tsukuba.

Abs.

Abs.
No. 259 Ghrelin gene sequence and expression in lines of chickens selected for high and low body weight. A. Y. Kuo1, C. M. Ashwell1, M. P. Richards1, S. M. Poch1, P. S. Siegel1, and D. M. Denbow1,1Virginia Polytechnic Institute and State University, 2Growth Biology Laboratory, USDA-ARS.

Abs.
No. 260 Rfp-Y haplotypes characterizing NIU White Leghorn parent lines 1 and 4. R. Kopulos1, W. E. Briles1, and M. Miller1,1Department of Biological Sciences, Northern Illinois University, DeKalb, IL, 2Beckman Medical Research Institute, City of Hope, Duarte, CA.

Abs.
No. 261 The identification of MHC haplotypes in bobwhites using hemagglutination and single-stranded conformational polymorphism (SSCP). L. Yates1, M. Miller2, and W. E. Briles1,1Department of Biological Sciences, Northern Illinois University, DeKalb, IL 60115, 2Beckman Medical Research Institute, City of Hope, Duarte, CA.

Abs.
No. 262 Disclosure of immune effects associated with non-MHC alloantigen systems. W. E. Briles*, 1Department of Biological Sciences, Northern Illinois University, DeKalb, IL.
Genetic polymorphisms in Guinea Fowl and chickens revealed by random amplification of polymorphic DNA (RAPD) and simple sequence repeat based primers. S. Nahashon*, N. Adefope, A. Amenyenu, and D. Wright, Cooperative Agricultural Research Program, Tennessee State University.

Mapping the chicken glycoprotein pituitary hormone alpha subunit gene. J. Yang*, R. Okimoto, K. Scarbrough, and J. Kirby, Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, AR.

Isolation and sequence determination of microsatellites from ducks (Anas platyrhynchos). M. Nagai*, H. Nakasu¹, T. Tozaki², T. Hasegawa³, M. K. Akbar¹, and K. Maruyama¹, ¹Meiji University, Kawasaki, Japan, ²Laboratory of Racing Chemistry, Utsunomiya, Japan, ³Japan Racing Association, Utsunomiya, Japan, ⁴Maple Leaf Farms, Indiana, USA.

Immunology

WITHDRAWN


Field evaluation of a novel bivalent vaccine against Infectious Bursal Disease (IBD) and Newcastle Disease (ND) by mixing viruses and antibodies contained in hyperimmune egg yolk. Heba Mousa, Assiut Univ., Egypt.

Avian intestinal antimicrobial peptides. C.J. Nile¹, C. Townes¹, G. Michailidis¹, B.H. Hirst¹, and J. Hall¹, ¹The University of Newcastle Upon Tyne, Newcastle Upon Tyne, UK.

Appearance of carotenoids in avian macrophage cell lines is time- and cell-line dependent. E. Koutsos*, California Polytechnic State University, San Luis Obispo, CA.

The effects of cloacal inoculation with Salmonella typhimurium on gene expression in the chicken bursa of Fabricius. C. M. Oubre¹º, N. Puebla-Osorio¹º, J Delrow¹º, B. D. Shamblin¹º, R. B. Moyes¹º, and L. R. Berghman¹º¹º, ¹Poultry Science Department, Texas A&M University, College Station, Texas, ²Biology Department, Texas A&M University, ³Fred Hutchinson Cancer Research Center, Seattle, WA.
Changes in delayed type hypersensitivity, egg antibody content and immune cell fatty acid composition of layer birds fed conjugated linoleic acid, n-6 or n-3 fatty acids. R. K. Selvaraj* and G. Cherian, Oregon State University, Corvallis, OR, USA.

**Nutrition**

273 Influence of crumbled pre-starter feed on growth performance and round heart disease when fed to turkey pouls. K. D. Roberson*, Michigan State University, East Lansing, MI.


277 Effect of dietary crude protein levels on the pectoralis breast muscle protein turnover in broiler chickens to 21 days of age. M. Urdaneta* and S. Leeson', 'University of Guelph, Canada, 'University of Zulia, Venezuela.

278 Evaluation of dietary crude protein levels on the lysine requirements in broiler chickens to 21 days of age. M. Urdaneta* and S. Leeson', 'University of Guelph, Canada, 'University of Zulia, Venezuela.

279 Evaluation of qualitative and quantitative methodologies for measuring feather quality and re-growth post-molt and effects of dietary cystine on feather growth. L. F. LaBrash* and S. Scheideler', 'University of Nebraska-Lincoln.

Dietary mineral retention of growing and finishing turkeys fed wheat-based diets supplemented with enzymes. A. A. Santos, Jr.*, P. R. Perret, J. L. Grimes, and F. B. O. Santos, North Carolina State University, Raleigh, NC/USA.

Evaluation of dietary Aspergillus meal prebiotic (Fermacto™) on poult performance, intestinal strength, tibial diameter and tibial strength: Hatch to 30 days-of-age. G. Tellez*, G. M. Nava*, J. L. Vicente*, D. J. Donoghue*, A. M. Donoghue*, W. E. Huff*, J. M. Balog†, S. Higgins†, L. Sutton†, and B. M. Hargis†, Department of Poultry Science, University of Arkansas, Fayetteville, Arkansas, 72701, ‡ USDA-ARS-PPPSRU University of Arkansas, Fayetteville, Arkansas, 72701, § PetAg Inc, Hampshire, IL, USA.


289 Phosphorus bioavailability of distiller’s dried grains plus solubles. B. S. Lumpkins*, A. B. Batal, and N. M. Dale, University of Georgia.


291 Meat and bone meal processed differently as an alternative protein source in broiler diets. M. Moschini¹, C. Cerioli¹, L. Picentini¹, M. Morlacchi², and G. Piva⁰, Università Cattolica del Sacro Cuore, Rome, Italy. ²CERZOO, San Bonico, Piacenza.

292 Effect of dietary putrescine (1, 4-diaminobutane) on growth, gastrointestinal polyamine metabolism and dry matter digestibility in turkey poults challenged with a mixed coccidial infection. S. R. Girdhar, J. R. Barta, and T. K. Smith, University of Guelph.

293 The expression of calbindin-28 kd mRNA and protein differs in chicks that are divergently selected for either a low or high incidence of tibial dyschondroplasia. R. B. Shirley*, A. J. Davis¹, M. M. Compton¹, and W. D. Berry¹, University of Georgia, Athens, GA/USA. ²Auburn University, Auburn, AL/USA.

294 Effect of dietary 1,4-diaminobutane (putrescine) on performance and intestinal development in broilers. F. Santoyo and T. K. Smith, University of Guelph.

295 Amino acid digestibility in corn distillers dried grains with solubles. T. Ergul*, C. Martinez Amezcua¹, C. M. Parsons², B. Walters¹, J. Brannon¹, and S. L. Noll¹, University of Minnesota, ²University of Illinois, ³University of Wisconsin-River Falls.

296 Effects of dietary phytase addition, non phytate phosphorus levels and two different feeding programs on female broilers performance. A. Ouyed* and M. R. Lefrancois, Université Laval.

297 The effect of replacing ground sorghum with whole sorghum on the performance of broilers. R. S. Beyer*, M. Greenwood, and K. Cramer, Kansas State University, Manhattan, KS.

298 Summary of body weight, feed conversion ratio, and mortality results from twenty-five broiler pen trials worldwide comparing mannan oligosaccharide diets versus unsupplemented or antibiotic diets. D. M. Hooge*, Hooge Consulting Service, Inc.

299 Turkey body weight, feed conversion ratio, and mortality results summarized from twenty pen trials worldwide comparing mannan oligosaccharide diets versus unsupplemented or antibiotic diets. D. M. Hooge*, Hooge Consulting Service, Inc.
300  Effect of reduced dietary non-phytin phosphorus (nPP) with or without phytase and 25-
hydroxycholecalciferol (25OHD₃) on performance in Laying hens. W. W. Saylor*, C. R. Angel, J. A. Mills, and J. A. Yon; Department of Animal and Food Sciences, University of Delaware, Newark, DE, Department of Animal and Avian Sciences, University of Maryland, College Park, MD.

301  Nutrient composition of corn distiller dried grains with solubles. S. L. Noll, C. Abe*, and J. Brannon; University of Minnesota, St. Paul, MN.

302  The effects of In-Ovo feeding of protein and carbohydrate on early growth and glycogen status of turkey poults. O. T. Foye*, Z. Uni, and P. R. Ferret; North Carolina State University, Raleigh NC, Hebrew University of Jerusalem, Israel.


304  Broiler breeder hen metabolizable energy requirements for maintenance and efficiency of utilization for producing egg calories. M. E. Reyes* and C. C. Coon; University of Arkansas.

305  Amino acid maintenance requirements for broiler breeder hens. N. K. Sakomura, M. Reys*, J.B.K. Fernandes, and C. Coon; Department of Poultry Science, University of Arkansas, Fayetteville, AR, USA.

306  The effects of feeding blends of grains naturally-contaminated with Fusarium mycotoxins on the efficacy of exogenous phytase in broiler diets. M. Zaytoun*, T. K. Smith*, and A. E. Sefton; University of Guelph, Guelph, Canada, Alltech Biotechnology Center Nicholasville, Ky, USA.

307  Effects of reduced dietary phosphorus level on broiler breeder production and egg quality. B. Michaud* and M. R. Lefrancois; Departement des sciences animales, Universite Laval.


309  Glucose and cationic amino acid transporter mRNA levels in broiler chickens after hatch. B. D. Humphrey, C. C. Calvert, and K. C. Klasing; University of California, Davis.

310  Effect of protein level of the quinoa cultivar Real on growth performance of turkey poults. N. P. Johnston*, C. E. Martinez, J. Mamani, and B. L. Webb; Brigham Young University, Provo, Utah.
311 Broiler ideal amino acid profile as determined with uric acid excretion, amino acid accretion, and nitrogen retention. J. M. Sun* and C. Coon, University of Arkansas, Fayetteville, AR.


313 Increased feed intake in broiler breeder hens enhances saturation of yolk precursor lipoprotein fatty acids in association with reproductive dysfunction. S. E. Chen* and R. Walzem, Department of Poultry Science, Texas A&M University.

314 Influence of graded levels of dietary phytase on phytate phosphorus retention in broilers. M. Manangi* and C. Coon, University of Arkansas, Fayetteville, Arkansas, USA.

315 Effect of phytase on phytate phosphorus retention in broilers fed diets containing different levels of Ca and P. M. Manangi* and C. Coon, University of Arkansas, Fayetteville, Arkansas, USA.

316 Evaluation of soybean meal samples from different sources in the US using phytase enzyme. M. Manangi*, J. Lu, and C. Coon, University of Arkansas, Fayetteville, Arkansas, USA.

317 Lysine requirements for maintenance and for tissue protein accretion in broiler breeders. N. K. Sakomura, M. Manangi*, J. B. K. Fernandes, and C. Coon, Department of Poultry Science, University of Arkansas, Fayetteville, AR, USA.

318 Evaluation of dietary lysine levels on breast muscle growth in broiler lines. J. M. Reddish* and M. S. Lilburn, The Ohio State University/OARDC.


320 Calcium limestone grain sizes and levels of calcium for commercial layers in second production cycle. A. G. Bertechini*, L. V. Faria, and E. J. Fassani, Universidade Federal de Lavras.


322 Carcass traits of French Guinea keet broilers fed diets with varying levels of crude protein and metabolizable energy. S. N. Nahashon*, N. A. Adefope, A. Amenyenu, and D. Wright, Cooperative Agricultural Research Program, Tennessee State University.

Glyceraldehyde-3-dehydrogenase expression in skeletal muscle is altered by nutritional status. P. E. Mozdziak*, J. J. Dibner*, and D. W. McCoy*, North Carolina State University, Raleigh NC, Novus International, St. Louis MO.

Effect of varying levels of dietary vitamins A and E and selenium and their interactions on performance, blood constituents, bone ash and immune response of broiler chicks. M. A. Metwally, Assiut University, Fac. of Agric., Animal Sci. Dept. EGYPT.

The effect of dietary copper sulphate on yolk and plasma cholesterol and production traits of Dandarawi hens. M. A. Metwally*, Faculty of Agric. Assiut University.

The effect of step-up and step-down protein rearing systems on subsequent egg production performance during a hot climatic condition. A. S. Hussein*, United Arab Emirates University, Al-Ain, United Arab Emirates.

Methimazole, thyroid hormone replacement and lipogenic enzyme gene expression in broilers. R. W. Rosebrough*, J. P. McMurtry, and M. P. Richards, USDA, Beltsville, MD.

Further studies on protein reversals and metabolism in the broiler. R. W. Rosebrough*, M. P. Richards, and J. P. McMurtry, USDA, Beltsville, MD.

Effects of commercial probiotic or prebiotic supplementation on production, size, and quality of hen’s eggs. Y. C. Chen* and T. C. Chen, Mississippi State University, Mississippi State, Mississippi.

Performance and carcass characteristics of broiler chicks as affected by different dietary types and levels of herbs and spices as non classical growth promoters. A. A. El-Deek* and M. A. Al-Harthi, Faculty of Meteorology, Environment and Arid land Agriculture, King Abdulaziz University.

Responses of laying hens to different levels of Amoxicillin, hot pepper and green tea as non conventional feed additives on productive performance, egg quality, chemical composition and cholesterol of yolk and plasma constituents. A. A. El-Deek* and M. A. Al-Harthi, Faculty of Meteorology, Environment and Arid land Agriculture, King Abdulaziz University.
Additive effect of Amoxicillin on performance, carcass characteristics, plasma constituents of broiler chicks fed diets containing black and hot pepper or their mixture. A. A. El-Deek* and M. A. Al-Harthi, Faculty of Meteorology, Environment and Arid land Agriculture, King Abdulaziz University.


Pathology


Prevalence, distribution and diversity of pathogenic E. coli in commercial turkey poult production. S. Banch*, F. Lago, and T. Rehberger, Agtech Products, Inc.

Co-infection of hens with Salmonella typhimurium and S. enteritidis reduces S. enteritidis infection severity during induced molt. P. S. Holt* and R. K. Gast, Southeast Poultry Research Laboratory, Athens, GA USA.

Physiology


Precocious semen production by turkey breeders. B. Koyyeri* and W. L. Bacon, The Ohio State University.

Reproductive characteristics and immune responses of cockerels under different thyroid status rendered after puberty. M. A. Abaza, S. A. Elnagar*, and A. El-Sebai, Alexandria University.
Age influences the response to progesterone injection in laying turkey hens. Wayne Bacon* and Han-Ken Liu, The Ohio State University.


Immunohistochemical visualization of the vasoactive intestinal peptide (VIP) receptor in the pituitary gland of the domestic chicken. A. Jurkevich*, L. R. Berghman, L. E. Cornett, and W. J. Kuenzel, Department of Poultry Science, University of Arkansas, Fayetteville, AR, **Texas A&M University, TX, *University of Arkansas for Medical Sciences, Little Rock, AR.

Expression of insulin-like growth factor (IGF) genes in liver and brain tissue during embryonic and post-hatch development of the turkey. M. Richards*, S. Poch, S. Clarke, and J. McMurtry, USDA, ARS, Growth Biology Laboratory, Beltsville, MD.


Effect of selected feed or water acidifiers on enteric pH of chicks. R. L. Jarquin*, G. M. Nava, A. D. Drake*, S. E. Higgins, L. A. Newberry, D. J. Donoghue, A. M. Donoghue, and B. M. Hargis, Department of Poultry Science, University of Arkansas, Fayetteville AR 72701, **USDA-ARS-PPISR University of Arkansas, Fayetteville AR.

Primordial germ cells as possible somatic cell nuclear recipients in the domestic chicken. T. Minematsu*, A. Tajima, and Y. Kanai, Institute of Agriculture and Forestry, University of Tsukuba.

The effect of a feed removal molting program on the skeletal integrity of White Leghorns. H. Mazzocco*, I. Grader, and P. Y. Hester, Purdue University, W. Lafayette, IN, Embrapa Swine and Poultry, Brazil.


Feed withdrawal alters intestinal morphology and attachment of *Salmonella enteritidis* in broilers. K. M. Burkholder*, K. L. Thompson, K. M. Banks, T. J. Applegate, and J. A. Patterson, Purdue University, West Lafayette, IN.

Protection of DNA and cellular membranes from reactive oxygen species mediated damage by uric acid and the effect of dietary induced changes in plasma uric acid on pulmonary hypertension syndrome (ascites) in broilers. B. M. Stinesfelt*1, S. Leonard1, X. Shi1, J. S. McHitz1, K. P. Blemings1, and H. Klandorf1, 1West Virginia University, Morgantown, WV/United States, 2National Institute of Occupational Safety and Health, Morgantown, WV/United States.


Testicular responses of male quail to heat stress: effects on steroidogenesis. H. Taira*, L. G. Robeson, and M. M. Beck, University of Nebraska-Lincoln, Lincoln, Nebraska.

*Eimeria acervulina* infection elicits an elevation in plasma ghrelin and changes in other metabolic hormones. J. McMurtry*, P. Allen, M. Richards, S. Poch, and D. Brocht, ARS, ANRI, USDA, Beltsville, MD.

The development of a homologous radioimmunoassay for chicken leptin. J. P. McMurtry*1, D. M. Brocht1, C. Ashwell1, P. Allen1, R. Leach1, and C. Coon1,1 ARS, USDA, 2The Pennsylvania State University, 3University of Arkansas.

Effects of F-strain *Mycoplasma gallisepticum* inoculation at twelve weeks of age on serum vitellogenin concentrations in commercial egg laying hens. E. D. Peebles*1, M. R. Burnham1, S. L. Branton1, K. O. Willeford1, J. R. Richardson1, and P. D. Gerard1,1 Mississippi State University, 2USDA-ARS, SPARC, Food and Feed Safety Research Unit, 3USDA-ARS, SCPR, ‘Emory University.

WITHDRAWN
Processing and Products


362 Breast meat characteristics and responses to acute heat stress in three broiler great-grandparent (GGP) lines. V. E. Cooke*, R. R. Hunter, and M. A. Mitchell, Roslin Institute (Edinburgh), Midlothian, UK.


364 Carcass characteristics, total lipids and fatty acid composition of broilers fed conjugated linoleic, n-6 or n-3 polyunsaturated fatty acids. G. Cherian*, M. P. Goeger, and L. K. Mathew, Department of Animal Sciences, Oregon State University, Corvallis, OR.


366 Effect of antioxidants on the consumer acceptance of irradiated turkey meat. E. J. Lee*, J. Love', and D. U. Ahn', Department of Animal Science, Iowa State University, Department of Food Science and Human Nutrition, Iowa State University.

Endotoxin-mediated pink color defect in chicken breasts. J. R. Claus*, M. E. Cook¹, M. Yang¹, L. M. Sammel¹, J. Sagili¹, and Z. F. Oberman¹, Department of Animal Sciences, University of Wisconsin-Madison.

Effect of regular and modified starches on the structure of chicken breast meat batter. S. Barbut*, University of Guelph.


Effects of refrigerated holding time on pH and tenderness of commercially marinated broiler breast parts. Y. C. Chen* and T. C. Chen, Mississippi State University, Mississippi State, Mississippi.