VIRTUAL

2020 PSA ANNUAL MEETING

July 20 - 22, 2020 • Online

POULTRY SCIENCE ASSOCIATION 1908

POULTRY SCIENCE ASSOCIATION
Virtual 2020 Annual Meeting Program

PROGRAM COMMITTEE

Thank you to Brian Fairchild and his Program Committee for their selfless efforts on our behalf. Please take a minute to express your appreciation.

Brian D. Fairchild, General Program Chair (2020)
Jason L. Emmert General Program Chair-Elect (2021)
Douglas R. Korver, General Program Chair-Elect (2022)
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Dawn Koltes, Extension and Instruction
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Jonathan Moyle, Management and Production
Charles W. Starkey, Metabolism and Nutrition: General Nutrition
Joshua Ryan Steed, Metabolism and Nutrition: Amino Acids
Michael E. Persia, Metabolism and Nutrition: Enzymes
John W. Boney, Metabolism and Nutrition: Feed Additives
Duarte Neves, Metabolism and Nutrition: Vitamins and Minerals
Kimberly M. Wilson, Microbiology and Food Safety
Andrew P. Benson, Physiology and Reproduction
Wayne D. Daley, Processing and Products
Maci Oelschlager and Erin Ross, Student Workshop
Douglas R. Korver and Roselina Angel, Informal Nutrition Symposium
Sami Dridi, Bruce M. Rathgeber and Robert E. Buresh, WPSA Lectureship
Elizabeth J. Kim, Bridging the Gap Symposium
Steven C. Ricke, Bioinformatics Symposium
Pierre-André Geraert and Robert B. Shirley, Layer Industry Symposium
Darrin Karcher, Deana R. Jones and Robert B. Beckstead, Laying Hens and Eggs Symposium
Elizabeth L. Karcher, Recruitment and Engagement Strategies Symposium
Leonardo Linares and Marco A. Rebollo, Bone Health and Lameness Symposium

PROGRAM GRID

Virtual 2020 PSA Annual Meeting

Monday, July 20th		
Time (CST)	**Section**	**Session**
7:00 am	**Virtual Conference Login Opens**	
9:00 am – 10:00 am	WPSA Lecture	The 2050 Challenge: Feeding the World Without Wasting It
10:00 am – 11:40 am	Symposium	Bridging the Gap: Best Practices for Field & Research Trials
12:00 pm – 2:30 pm	Informal Nutrition Symposium	Ingredient Quality Assessment for Old and New Ingredients
1:00 pm – 2:30 pm	Poster Chat Session	Animal Well-Being and Behavior
2:00 pm – 3:30 pm	Poster Chat Session	Extension and Instruction
2:30 pm – 4:00 pm	Poster Chat Session	Physiology and Reproduction
2:30 pm – 5:20 pm	Symposium	Educating the Next Generation of Poultry Scientists on Bioinformatics
3:00 pm – 4:30 pm	Poster Chat Session	Processing and Products
5:30 pm – 6:30 pm	**Social Event**	**Cheers to Our 'Fellow' Peers** *Enjoy your favorite beverage as we celebrate the accomplishments of the 2020 PSA Fellow recipients.*

Tuesday, July 21st		
Time (CST)	**Section**	**Session**
9:00 am – 10:30 am	Poster Chat Session	Metabolism and Nutrition, General Nutrition
9:00 am – 12:30 pm	Symposium	Market, Welfare and Nutritional Dynamics of the Laying Industry: How the Layer Industry has Changed, Where it is Today, and Where it May be Going
10:00 am – 11:30 am	Poster Chat Session	Metabolism and Nutrition, Vitamins and Minerals
11:00 am – 12:30 am	Poster Chat Session	Genetics and Molecular Biology
12:30 pm – 2:15 pm	Student Workshop	How to Be a Better Reviewer
2:30 pm – 4:00 pm	Poster Chat Session	Metabolism and Nutrition, Amino Acids
2:30 pm – 5:30 pm	Symposium	Laying Hens and Eggs: Where is Industry and Where is Academia?
3:00 pm – 4:30 pm	Poster Chat Session	Metabolism and Nutrition, Enzymes
3:30 pm – 5:00 pm	Poster Chat Session	Metabolism and Nutrition, Feed Additives
5:30 pm – 6:30 pm	**Social Event**	**PSA Trivia EGGstravaganza** *Test your trivia knowledge on anything and everything! Join in on the fun and play for your chance to win a prize!*

Wednesday, July 22nd		
Time (CST)	**Section**	**Session**
9:00 am – 10:30 am	Poster Chat Session	Immunology, Health and Disease
9:00 am – 11:20 am	Symposium	Strategies to Increase Recruitment and Engagement of a Future Poultry Workforce
10:00 am – 11:30 am	Poster Chat Session	Management and Production
11:00 am – 12:30 pm	Poster Chat Session	Microbiology and Food Safety
11:30 am – 2:00 pm	Symposium	Bone Health and Lameness, the Tip of an Iceberg
2:00 pm – 3:00 pm	**Business Meeting**	**PSA Student Hatchery Business Meeting** *PSA student members are invited to participate.*
3:00 pm – 4:30 pm	**Business Meeting**	**PSA Business Meeting** *PSA professional and graduate student members are invited to participate.*

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SYMPOSIA AND WORKSHOPS

Monday, July 20th

WPSA Lecture:
The Impact of the Current Climate Change Discussion on the Poultry Industry and How We Can Help Spread the Truth

The 2050 challenge is real: throughout our lifetime, the global human population will triple without a concurrent increase of natural resources to produce more food. As a result, agriculture will have to become much more efficient worldwide and engage in an efficient path similar to the one it has traveled down in U.S. livestock and poultry production in recent decades. It will take collaboration at all levels of the food system and sound science to meet this challenge.

Chairs: Sami Dridi, University of Arkansas;
and Bruce M. Rathgeber, Dalhousie University

Virtual Ballroom

9:00 AM 305S **The 2050 Challenge: Feeding the World Without Wasting It.**
Frank M. Mitloehner*, *University of California, Davis, California, United States*

Symposium:

Bridging the Gap: Best Practices for Field & Research Trials

"Bridging the Gap" will examine academic and industry perspectives on trials and decision-making around them by examining design & statistics, techniques & parameters to measure, impact of research vs. commercial conditions as well as considerations around mimicking the commercial setting in controlled tests.

Chair: Elizabeth J. Kim, Dupont Danisco Animal Nutrition

Virtual Ballroom

10:00 AM **Introduction**
Elizabeth J. Kim*, *Dupont Danisco Animal Nutrition, Burford, Georgia, United States*

10:00 AM 306S **From the Field to the Lab – Modeling the nutritional impacts of enteric challenges.**
Samuel J. Rochell*, *University of Arkansas, Fayetteville, Arkansas, United States*

10:10 AM 307S **How can the Environment Impact Your Research & Field Trials?**
Brian D. Fairchild*, *University of Georgia, Athens, Georgia, United States*

10:20 AM 308S **I want to be significant! Best practices to get the most from your field data.**
Nickki Tillman*, *Nutritional Solutions LLC, Buford, Georgia, United States*

10:40 AM 309S **A field veterinarian's perspective: What does all this data mean in decision making?**
Elizabeth Dale*, *Pilgrim's, Greeley, Colorado, United States*

11:00 AM 310S **A field nutritionist's perspective: The role of research data in decision-making.**
Jeffrey T. Pope*, David J. Burnham, *House of Raeford, Rose Hill, North Carolina, United States*

11:20 AM **Panel Discussion**

**Presenter* *All Times are CST*

Informal Nutrition Symposium:

Ingredient Quality Assessment for Old and New Ingredients

Accurate feed ingredient evaluation is essential for precise formulation of poultry diets. However, many challenges remain in the process of transforming raw ingredients into a complete feed that meets the needs of modern poultry. Variation in nutrient content, effects of processing on nutrient content and the incorporation of novel or poorly characterized ingredients add to the challenges. The symposium will provide practical information on feed evaluation in poultry nutrition, as well as the opportunities and challenges associated with novel feed ingredients for the poultry industry. The speakers in the second session will also devote attention to the process of evaluating the novel feedstuffs as potential ingredients in poultry diets.

Chairs: Douglas R. Korver, University of Alberta;
and Roselina Angel, University of Maryland

Virtual Ballroom

12:00 PM **Introduction**
Roselina Angel*, *University of Maryland, College Park, Maryland, United States*

12:05 PM 311S **Feed evaluation: NIR technologies, quality system and utilization.**
Alessandro Stercoli*, *Cargill, Fiorenzuola d'Arda, Piacenza, Italy*

12:30 PM 312S **Using near infrared spectroscopy results in commercial diet formulation.**
Peter V. Chrystal*[1, 2],[1]PRF, *University of Sydney, Pendle Hill, New South Wales, Australia,* [2]*Baiada Poultry, Pendle Hill, New South Wales, Australia*

1:10 PM 313S **Applying feed evaluation results – accurate delivery of formulated nutrients.**
Mike Blair*, *United Animal Health Inc., Woodstock, Georgia, United States*

1:35 PM 314S **Strategies to evaluate novel ingredients for poultry diets.**
Rex W. Newkirk*, *University of Saskatchewan, Saskatoon, Saskatchewan, Canada*

1:55 PM 315S **Novel feed ingredients: Insect protein and chitin products.**
Liz Koutsos*, *EnviroFlight LLC, Maysville, Kentucky, United States*

2:15 PM **Symposium summary, panel discussion and Life Mentors awards.**
Douglas R. Korver*, *University of Alberta, Edmonton, Alberta, Canada*

Symposium:

Educating the Next Generation of Poultry Scientists on Bioinformatics

Bioinformatics is rapidly emerging as a tool to poultry scientists. Big data is a not only a significant buzz term, but the endless potential of such incredible data sets is rapidly emerging as a keystone piece of information that we must all have for the future of our fields. Unfortunately, there are numerous barriers to successfully implementing bioinformatics as a component of a research program. Issues like data security, bioinformatics options, and how to communicate data to both professional scientists and the public are all significant issues that new poultry scientists, professionals must grasp. Therefore, the purpose of this symposia is to fully discuss the use of big data from collection to final analysis.

Chair: Steven C. Ricke, University of Arkansas

Virtual Ballroom

2:30 PM **Introduction**
Steven C. Ricke*, *University of Arkansas, Fayetteville, Arkansas, United States*

2:30 PM 316S **Standardizing microbiome analytics for the poultry grower.**
Kristina M. Feye*, *University of Arkansas, Fayetteville, Arkansas, United States*

3:00 PM 317S **Delivery of bioinformatics to poultry processing.**
Steven C. Ricke*, *University of Arkansas, Fayetteville, Arkansas, United States*

3:30 PM 318S **Communicating bioinformatics to small poultry producers.**
Michael J. Rothrock*, *USDA-ARS-USNPRC, Athens, Georgia, United States*

4:00 PM 319S **Communicating complex data sets to poultry nutritionists.**
Joshua Jendza*, *BASF Corporation, Basking Ridge, New Jersey, United States*

4:30 PM 320S **Combining microbiome, gene copy, and metabolic pathway in the analysis: A multi-omics case study.**
Bill Shannon*, *BioRankings, St. Louis, Missouri, United States*

5:00 PM **Roundtable discussion**

Tuesday, July 21st

Symposium:

Market, Welfare and Nutritional Dynamics of the Laying Industry: How the Layer Industry has Changed, Where it is Today, and Where it May be Going

Through molecular biology, nutrition, management and market dynamics, this symposium will delve into what is needed to support different laying operation strategies and lengths of lay.

Chairs: Pierre-André Geraert, Adisseo France SAS;
and Robert B. Shirley, Adisseo USA Inc.

Virtual Ballroom

9:00 AM **Introduction**
Robert B. Shirley*, *Adisseo USA Inc., Woodstock, Illinois, United States*

9:00 AM 321S **Worldwide egg market dynamics and its evolution with new generation of consumers.**
Vincent Guyonnet*, *FFI Consulting Ltd., Ottawa, Ontario, Canada*

9:35 AM 322S **New insights on eggshell mineralization and how they can contribute to maintain shell quality.**
Joel Gautron*[1, 2], Lilian Stapane[1], Alejandro Rodriguez-Navarro[3], Yves Nys[1], M.T. Hincke[4], [1]*INRAe, Nouzilly, France,* [2]*Avian Biology & Poultry Research unit, Université de TOURS, Tours, France,* [3]*University of Granada, Granada, Spain,* [4]*University of Ottawa, Ottawa, Ontario, Canada*

10:10 AM 323S **Laying hen welfare: From threats to market opportunities.**
Thea van Niekerk*, *Wageningen UR Livestock Research, Lelystad, Netherlands*

10:45 AM 324S **A review on the amino acid nutrition of layers.**
Michael T. Kidd*[1], Robert E. Loar[2], [1]*University of Arkansas, Fayetteville, Arkansas, United States,* [2]*Cal-Maine Foods, Inc., Jackson, Mississippi, United States*

11:20 AM 325S **The evolution of nutritional strategies for production that focuses on conventional, cage-free aviaries, free-range markets.**
Michael A. Elliot*, *A&E Nutrition Services, LLC, East Petersburg, Pennsylvania, United States*

12:05 PM **Roundtable discussion**

Student Workshop:

How to Be a Better Reviewer

The purpose of this workshop is to make the review process more transparent and guide young poultry scientists on how to be a successful reviewer of a manuscript. This workshop will also aim to establish an appreciation for what it means to be a good reviewer and how that impacts the success of a peer-reviewed journal, like Poultry Science® and The Journal of Applied Poultry Research.

Chair: Maci Oelschlager, University of Illinois

Virtual Ballroom

12:30 PM **Introduction**
Maci Oelschlager*, *University of Illinois, Urbana, Illinois, United States*

12:30 PM 326S **How to be a better reviewer: Section Editor perspective.**
Wei Zhai*, *Mississippi State University, Starkville, Mississippi, United States*

12:50 PM **Questions and Answers**

1:05 PM 327S **How to be a better reviewer: Reviewer perspective.**
Ryan Dilger*, *University of Illinois, Urbana, Illinois, United States*

1:25 PM **Questions and Answers**

1:40 PM 328S **How to be a better reviewer: Publisher perspective.**
Diana Jones*[1], Tom Fitzpatrick[2], [1]*Elsevier Inc., Sydney, New South Wales, Australia,* [2]*Elsevier Inc., San Diego, California, United States*

2:00 PM **Questions and Answers**

Symposium:

Laying Hens and Eggs: Where is Industry and Where is Academia?

There is a disconnect between industry, regulatory agencies and academia. This symposium will be a step toward establishing the annual Poultry Science meeting as the platform to engage on issues related to research and education needs. This translates to the opportunity to actively engage them regarding the science. The symposium will encourage people who do not typically come to Poultry Science from the regulatory agencies and industry commodity groups. Finally, this symposium will provide an opportunity to identify and tap donor that we have not engaged in the past.

Chairs: Darrin M. Karcher, Purdue University; Deana R. Jones, USDA-ARS-USNPRC; and Robert B. Beckstead, North Carolina State University

Virtual Ballroom

2:30 PM **Introduction**
Deana R. Jones*, *USDA-ARS-USNPRC, Athens, Georgia, United States*

2:30 PM 329S **World perspective on egg regulations.**
Mark Lobstein*, *USDA-AMS, Washington, District of Columbia, United States*

2:50 PM 330S **World perspective on egg production.**
Tim Lambert*, *Egg Farmers of Canada, Ottawa, Ontario, Canada*

3:10 PM 331S **Overview of table egg industry: current issues/concerns.**
Chad Gregory*, *United Egg Producers, Johns Creek, Georgia, United States*

3:30 PM 332S **Regulatory bodies within the table egg industry – What is the scope of the agency? (FDA)**
Gerardo A. Ramirez*, *U.S. Food & Drug Administration, College Park, Maryland, United States*

3:45 PM 333S **Regulatory bodies within the table egg industry – What is the scope of the agency? (USDA)**
Jeffrey Hendricks*, *USDA-AMS, Washington, District of Columbia, United States*

4:00 PM 334S **Regulatory bodies within the egg products industry – What is the scope of the agency?**
Erika K. Stapp-Kamotani*, *USDA-FSIS, Washington, District of Columbia, United States*

4:15 PM 335S **Regulatory bodies within the table egg industry – What is the scope of the agency?**
Justin Jarocki*, *National Egg Regulatory Officials, Farmington, Minnesota, United States*

4:30 PM 336S **Academic perspective – where are we?**
Darrin M. Karcher*, *Purdue University, West Lafayette, Indiana, United States*

4:40 PM 337S **Canada perspective – where are we?**
Douglas R. Korver*, *University of Alberta, Edmonton, Alberta, Canada*

4:50 PM 338S **Europe perspective – where are we?**
Jasper L. Heerkens*, *Aeres University of Applied Sciences, Dronten, Flevoland Province, Netherlands*

5:00 PM **Panel discussion: Industry and regulatory body research and education needs**

Wednesday, July 22nd

Symposium:

Strategies to Increase Recruitment and Engagement of a Future Poultry Workforce

There is an increasing number of students seeking baccalaureate degrees in Animal and Poultry Science majors with limited previous food animal experience. Although a large number of agricultural job openings exist, students are often unaware of the available careers and employment opportunities. The poultry industry is one area that is often overlooked. Therefore, it is essential that students are exposed to opportunities in the poultry industry early in their academic programming. Strategies to increase student engagement must be implemented in the classroom to foster subject-specific curiosity. Increasing student interest and curiosity may directly increase students' motivation to start or continue studying poultry science. Topics that will be included in the symposia include the pedagogy of motivation and examples of ways to create interest. New methods of implementing active learning in the classroom to create interest will also be discussed. Finally, innovative recruitment and distant learning strategies will be discussed.

Chair: Elizabeth L. Karcher, Purdue University

Virtual Ballroom

9:00 AM **Introduction**
Elizabeth L. Karcher*, *Purdue University, West Lafayette, Indiana, United States*

9:05 AM 339S **Recruitment Strategies for the Next Generation of Poultry Workers.**
Jessica B. Wells*, *Mississippi State University, Starkville, Mississippi, United States*

9:20 AM 340S **Industry approaches to recruiting students and connecting with academia.**
Stacy Webb*, *Sanderson Farms, Laurel, Mississippi, United States*

9:35 AM 341S **Engaging the Next Generation of Poultry Professionals.**
Elizabeth L. Karcher*, *Purdue University, West Lafayette, Indiana, United States*

9:50 AM 342S **Innovative Uses of Technology to Recruit and Reach Students.**
Marissa Herchler*, *North Carolina State University, Raleigh, North Carolina, United States*

10:05 AM **Questions and Answers**

10:20 AM **Panel Session**
Marisa Erasmus, *Purdue University, West Lafayette, Indiana, United States,* Jessica N. Fife, *University of Georgia, Athens, Georgia, United States,* Frank E. Robinson, *University of Alberta, Edmonton, Alberta, Canada,* Dave Hasemann, *Rose Acre Farms, Rensselaer, Indiana, United States*

Symposium:
Bone Health and Lameness, the Tip of the Iceberg

This symposium will link all the aspects that influence bone health, from a standpoint of generational nutrition and embryo development until market weight, and interactions with nutrition, gut health and environment challenges.

Chair: Marco A. Rebollo, Zinpro Corporation
Virtual Ballroom

11:30 AM **Introduction**
Marco A. Rebollo*, *Zinpro Corporation, Eden Prairie, Minnesota, United States*

11:30 AM 343S **The development of osteochondrosis and tibial dyschondroplasia and the role of trace minerals and vitamins.**
Laura Amundson*[1, 2], [1]*Zinpro Corporation, Eden Prairie, Minnesota, United States,* [2]*University of Wisconsin, Madison, Wisconsin, United States*

11:50 PM **Questions and Answers**

12:00 PM 344S **The influence of generational nutrition on bone development.**
Sergio L. Vieira*, *Federal University of Rio Grande do Sul, Porto Alegre, Brazil*

12:20 PM **Questions and Answers**

12:30 PM 345S **Linking gut health issues with lameness and food safety.**
Charles L. Hofacre*, *Southern Poultry Research Group, Watkinsville, Georgia*

12:50 PM **Questions and Answers**

1:00 PM 346S **Targeting Performance and Bone Health with Macro-Mineral Nutrition.**
Roselina Angel*, *University of Maryland, College Park, Maryland, United States*

1:20 PM **Questions and Answers.**

1:30 PM 347S **How feed additives influence lameness.**
Adnan K. Alrubaye*, *University of Arkansas, Fayetteville, Arkansas, United States*

1:50 PM **Questions and Answers**

**Presenter*

SOCIAL EVENTS

Monday, July 20th

Cheers to Our 'Fellow' Peers

Enjoy your favorite beverage as we celebrate the accomplishments of this year's Fellows.

Virtual Networking Lounge

5:30 PM **Kenneth E. Anderson, 2020 PSA Fellow**
North Carolina State University, Raleigh, North Carolina, United States

5:30 PM **Todd J. Applegate, 2020 PSA Fellow**
University of Georgia, Athens, Georgia, United States

5:30 PM **Jeanna L. Wilson, 2020 PSA Fellow**
University of Georgia, Athens, Georgia, United States

Tuesday, July 21st

PSA Trivia EGGstravaganza

Test your trivia knowledge on anything and everything! Join in on the fun and play for your chance to win a prize!

Virtual Networking Lounge

5:30 PM **PSA Trivia EGGstravaganza**

BUSINESS MEETINGS

Wednesday, July 22nd

PSA Student Hatchery Business Meeting

All student members of the Poultry Science Association are invited to participate.

Virtual Ballroom

2:00 PM

Introduction
Maci Oelschlager, PSA Senior Student Director
Erin Ross, PSA Junior Student Director

PSA Student Hatchery Business

Outstanding Student Award

Student Video Competition

Student Director Election Results

Questions and Answers

PSA Business Meeting

All professional and graduate student members of the Poultry Science Association are invited to participate.

Virtual Ballroom

3:00 PM

Call to Order
Donald R. McIntyre, PSA President

Report of the Board of Directors
Donald R. McIntyre, PSA President

Report of the Secretary-Treasurer
Douglas F. Britton, PSA Secretary-Treasurer

Report of the *Poultry Science*® Editor-in-Chief
Robert L. Taylor, Jr., Editor-in-Chief

Report of *The Journal of Applied Poultry Research* Editor-in-Chief
John B. Carey, Editor-in-Chief

Report of the PSA Student Hatchery
Maci Oelschlager, PSA Senior Student Director

Report of the PSA Foundation
Christopher D. Knight, Chair, PSA Foundation Board of Trustees

Report of the Resolutions Committee
Mary M. Beck, Committee Chair

Announcement of Election Results
Donald R. McIntyre, PSA President

Recognition of Annual Meeting Program Chair
Brian D. Fairchild, 2020 Program Chair

Recognition of Retiring Board of Directors
Donald R. McIntyre, PSA President

Passing of the Gavel
Donald R. McIntyre, PSA President

Closing Comments
Christine Alvarado, PSA President-Elect

ABSTRACT PRESENTATIONS

Animal Well-Being and Behavior

Chair: Shawna L. Weimer, University of Maryland

Virtual Session Room I

1 **The gut microbiota-brain axis: Modifications of injurious behaviors and physiological homeostasis in chickens through early postnatal cecal microbiota transplantation.**

Yuechi Fu[GS*1], Jiaying Hu[1], Heng-wei Cheng[2]

[1]Purdue University, West Lafayette, Indiana, United States, [2]Livestock Behavior Research Unit, USDA-ARS, West Lafayette, Indiana, United States

2 **Omega-3 in maternal diet improves cognitive performance of broiler chicks in a T-maze test.**

Rosemary Whittle[GS*], Elijah Kiarie, Tina Widowski

University of Guelph, Guelph, Ontario, Canada

3 **Tryptophan metabolism, Stress and Feather Pecking in Pullets.**

Claire Mindus[GS*1], Nienke van Staaveren[1], Paul Forsythe[2], Simon Geisler[3], Johanna M. Gostner[3], Joergen B. Kjaer[4], Wolfgang Kunze[2], Anna Kate Shoveller[1], Dietmar Fuchs[3], Alexandra Harlander[1]

[1]Ontario Agricultural College, University of Guelph, Guelph, Ontario, Canada, [2]McMaster Brain-Body Institute, St. Joseph's Healthcare, Hamilton, Ontario, Canada, [3]Institutes of Medical Biochemistry and Biological Chemistry, Biocenter, Innsbruck Medical University, Innsbruck, Austria, [5]Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health, Institute of Animal Welfare and Animal Husbandry, Celle, Germany

4 **Effect of light intensity on calcium homeostasis in pullets.**

Gula Sadvakassova*[1, 2], Jo Ann Chew[3], Kailyn Beaulac[3], Hossein Poorhemati[2, 4], Karen Schwean- Lardner[3], Svetlana V. Komarova[1, 2, 4]

[1]McGill University, Montreal, Quebec, Canada, [2]Shriners Hospital for Children, Montreal, Quebec, Canada, [3]University of Saskatchewan, Edmonton, Alberta, Canada, [4]McGill University, Montreal, Quebec, Canada

5 **The effects of rearing cage type and calcium particle size on keel bone characteristics of laying hens.**

Madeleine Browne*[1, 2], Tanka Khanal[2], Tina Widowski[2], Elijah Kiarie[2]

[1]Chicken Farmers of Ontario, Burlington, Ontario, Canada, [2] Animal Biosciences, University of Guelph, Guelph, Ontario, Canada

6 **The effect of light wavelengths on broilers: more than meets the eye.**

Bruna Maria Remonato Franco[GS*1], Marina Leis[2], Melody Wong[3], Tory Shynkaruk[1], Bryan Fancher[5], Nick French[5], Scott Gillingham[5], Karen Schwean-Lardner[4]

[1]Animal and Poultry Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [2]Department of Small Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [3]Department of Ophthalmology, Saskatoon City Hospital, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [4]Animal and Poultry Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [5]Aviagen, Huntsville, Alabama, United States

7 **Differences in feather corticosterone level between purebred turkey lines with different breeding objectives.**

Emily M. Leishman[GS*1], Nikole E. Freeman[2], Amy E. Newman[2], Nienke van Staaveren[1], Ben J. Wood[1, 3, 4], Alexandra Harlander[1], Christine F. Baes[1, 5]

[1]Animal Biosciences, University of Guelph, Guelph, Ontario, Canada, [2]Integrative Biology, University of Guelph, Guelph, Ontario, Canada, [3]Hybrid Turkeys, Kitchener, Ontario, Canada, [4]School of Veterinary Science, University of Queensland, Gatton, Queensland, Australia, [5]Institute of Genetics, University of Bern, Bern, Switzerland

**Presenter*

[GS] Graduate Student Presenter

[UG] Undergraduate Student Presenter

8 **Maternal age and housing system of laying hens interact to affect measures of fear andstress in their offspring.**
Mariana R. Peixoto*[1], Leanne Cooley[2], Tina Widowski[1]
[1]Animal Biosciences, University of Guelph, Guelph, Ontario, Canada, [2]L.H. Gray & Son Limited, Strathroy, Ontario, Canada

9 **Male familiarity and aggressive behavior: two modulators of female Japanese quailsocial preferences.**
Stefania Pellegrini[1, 2], Diego A. Guzman[1, 2], Raul H. Marin*[1, 2]
[1]Universidad Nacional de Córdoba, Facultad de Ciencias Exactas, Físicas y Naturales, Instituto de Ciencia y Tecnología de los Alimentos (ICTA), Cordoba, Argentina, [2]Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Instituto de Investigaciones Biológicas y Tecnológicas (IIByT, CONICET-UNC), Cordoba, Argentina

10 **Circadian Rhythm of Dust Bathing in 4 Strains of Laying Hen.**
Tessa Grebey[GS]*[1], Ahmed B. Ali[2], Janice C. Swanson[1], Tina Widowski[3], Janice Siegford[1]
[1]Animal Science, Michigan State University, East Lansing, Michigan, United States, [2]Animal and Veterinary Sciences Department, Clemson University, Clemson, South Carolina, United States, [3]Department of Animal Biosciences, Animal Science and Nutrition, University of Guelph, Guelph, Ontario, Canada

11 **Comparison of electrocardiogram parameters during two methods of euthanasia in white leghorn hens.**
Ashley Bigge[GS]*[1], Craig Kreikemeier-Bower[2], Allison Reisbig[3], Kathryn Hanford[4], Sheila Purdum[1]
[1]Animal Science, University of Nebraska-Lincoln, Lincoln, Nebraska, United States, [2]Research Resp- Inst Animal Care Prog UNL, University of Nebraska-Lincoln, Lincoln, Nebraska, United States, [3]Retiree UNL, University of Nebraska-Lincoln, Lincoln, Nebraska, United States, [4]Statistics IANR, University of Nebraska-Lincoln, Lincoln, Nebraska, United States

12 **Evaluation of two fill rates for CO_2 euthanasia in turkeys.**
Elein Hernandez*[1, 2], Stephanie Torrey[2], Logan Patterson[2], Fiona James[4], Karen Schwean-Lardner[3], Patricia Turner[5], Tina Widowski[2]
[1]Surgery and Clinical Studies, Universidad Nacional Autonoma de Mexico (UNAM), CIudad de Mexico, Mexico City, Mexico, [2]Animal Biosciences, University of Guelph, Guelph, Ontario, Canada, [3]Animal and Poultry Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [4]Clinical Studies, University of Guelph, Guelph, Ontario, Canada, [5]Pathobiology, University of Guelph, Guelph, Ontario, Canada

13 **Are broiler chicks'substrate preferences altered by soiling or type of wood shavings?**
Valerie Monckton[GS]*, Nienke van Staaveren, Alexandra Harlander
Animal Biosciences, University of Guelph, Guelph, Ontario, Canada

14 **Spatial complexity during early life affects activity and navigation skills of laying henpullets.**
Ana K. Rentsch[GS]*, Tina Widowski
Animal Bioscience, University of Guelph, Guelph, Ontario, Canada

15 **Broiler laser enrichment stimulated laser-following behavior and indirectly increased proportion of birds moving.**
Meaghan M. Meyer[GS]*, Anna K. Johnson, Elizabeth A. Bobeck
Animal Science, Iowa State University, Ames, Iowa, United States

16 **Impact of environmental enrichment and stocking density on affective states of broilerchickens.**
Mallory G. Anderson[GS]*, Andrew M. Campbell, Alexa Johnson, Madi Casey, Leonie Jacobs
Animal and Poultry Sciences, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, United States

17 **Self- and conspecific-directed pecking behavior of commercial Pekin ducks.**
Yiru Dong[GS]*, Darrin M. Karcher, Marisa Erasmus
Department of Animal Sciences, Purdue University, West Lafayette, Indiana, United States

18 **Similarity in movement patterns in chickens increases with time and social association.**
Klara J. Grethen[GS*1], Yamenah Gómez[1], John Berezowski[2], Yandy Abreu Jorge[3], Sabine Gebhardt- Henrich[1], Sabine Vögeli[1], Ariane Stratmann[1], Michael J. Toscano[1], BernhardVölkl[4]
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19 **What do farmers think about health and welfare issues in turkey production?**
Nienke van Staaveren*[1, 2], Emily M. Leishman[1], Sarah Adams[1], Ben J. Wood[1, 3, 4], Alexandra Harlander[2], Christine F. Baes[1, 5]
[1]Centre for the Genetic Improvement of Livestock, Department of Animal Biosciences, University of Guelph, Guelph, Ontario, Canada, [2]The Campbell Centre for the Study of Animal Welfare, Department of Animal Biosciences, University of Guelph, Guelph, Ontario, Canada, [3]Hybrid Turkeys, Kitchener, Ontario, Canada, [4]School of Veterinary Science, University of Queensland, Gatton, Queensland, Australia, [5]Institute of Genetics, Vetsuisse Faculty, University of Bern, Bern, Switzerland

20 **Impact of stocking density and environmental complexity on performance of male broiler chickens.**
Andrew M. Campbell[GS*], Mallory G. Anderson, Alexa Johnson, Madi Casey, Leonie Jacobs
Animal and Poultry Sciences, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, United States

21 **Attracting young turkey poults to feeders to avoid litter-eating.**
Sameeha Jhetam[GS*], Kailyn Beaulac, Karen Schwean-Lardner
Animal and Poultry Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

22 **The impact of light intensity and strain on behavior and welfare of egg-strain pullets reared in perchery systems from 0 to 16 weeks of age.**
Jo Ann Chew[GS*1], Tory Shynkaruk[1], Eugenia Herwig[1], Tina Widowski[2], Karen Schwean-Lardner[1]
[1]Department of Animal and Poultry Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [2]Department of Animal Biosciences, University of Guelph, Guelph, Ontario, Canada

23 **Rearing enrichments, outdoor ranging and environmental stress impacted free-range hen welfare.**
Md Saiful Bari[GS*1, 2], Jeff A. Downing[3], Tim R. Dyall[2], Caroline Lee[2], Dana L. Campbell[2]
[1]School of Environmental and Rural Science, University of New England, Armidale, New South Wales, Australia, [2]Agriculture and Food, Commonwealth Scientific and IndustrialResearch Organisation (CSIRO), Armidale, New South Wales, Australia, [3]School of Life and Environmental Science, Faculty of Veterinary Science, University of Sydney, Sydney, New South Wales, Australia

24 **Comparison of footpad dermatitis scores in market turkey hens.**
Gabriella Furo[GS*1], Carol Cardona[2], Yuzhi Li[3], Sally L. Noll[1]
[1]Department of Animal Science, University of Minnesota, Saint Paul, Minnesota, United States, [2]Department of Veterinary and Biomedical Sciences, University of Minnesota, Saint Paul, Minnesota, United States, [3]West Central Research and Outreach Center, University of Minnesota, Morris, Minnesota, United States

25 **Prevalence and severity of footpad dermatitis in commercial turkeys flocks in the Midwestern United States.**
Gabriella Furo[GS*1], Darrin M. Karcher[2], Kailynn Scoles[2], Shawna L. Weimer[3], Sally L. Noll[1]
[1]Department of Animal Science, University of Minnesota, Saint Paul, Minnesota, United States, [2]Department of Animal Sciences, Purdue University, West Lafayette, Indiana, United States, [3]Animal and Avian Sciences, University of Maryland, College Park, Maryland, United States

26 **Use of Environmental Enrichments in colony caged Japanese Quail to reduce damaging behaviors.**
Melissa Rudo, Chirantana Mathkari[GS*], Rachel Dennis
ANSC, University of Maryland, College Park, Maryland, United States

27 **Are beak growth and pullet performance affected by natural beak smoothing feeders and outdoor vegetation density?**

Xavier Averós*[1], Paul Patterson[2], Nuket Acar[2], Iván Pineda[3], Inma Estevez[1, 4]
[1]Animal Production, Neiker, Arkaute, Spain, [2]Penn State University, University Park, Pennsylvania, United States, [3]Universidad Nacional Autónoma de México, Ciudad de México, Mexico, [4]IKERBASQUE Basque Foundation for Science, Bilbao, Spain

28 **Impact of Vegetation Density on Outdoor Paddock Utilization and Behavior by Growing Pullets.**

Paul Patterson*[1], Xavier Averós[2], Nuket Acar[3], Iván Pineda[4], Inma Estevez[2]
[1]Animal Science, Penn State University, University Park, Pennsylvania, United States, [2]Animal Production, Neiker-Tecnalia, Arkaute, Spain, [3]Veterinary and Biomedical Sciences, Penn State University, University Park, Pennsylvania, United States, [4]Universidad Nacional Autónoma de México, Mexico City, Mexico

29 **Effect of rearing aviary style and genetic strain on musculoskeletal characteristics of layer pullets.**

Amanda Pufall[GS]*, Tina Widowski
Animal Biosciences, University of Guelph, Guelph, Ontario, Canada

30 **Comparison of *in vivo* and *ex vivo* three-dimensional keel bone models at two timepoints in brown laying hens.**

Kaylee Montney[UG]*[1], Prafulla Regmi[3], Cara Robison[1], Brittney Emmert[1], Darrin M. Karcher[2]
[1]Department of Animal Science, Michigan State University, East Lansing, Michigan, United States, [2]Department of Animal Sciences, Purdue University, West Lafayette, Indiana, United States, [3]Department of Poultry Science, North Carolina State University, Raleigh, North Carolina, United States

31 **Using accelerometers to examine differences in inactivity between conventional and slower growing broiler chickens.**

Lauren Dawson*, Zhenzhen Liu, Tina Widowski, Stephanie Torrey
Animal Biosciences, University of Guelph, Guelph, Ontario, Canada

32 **Utilizing 3-dimensional models to assess keel bone damage in laying hens throughout the lay cycle.**

Brittney Emmert[UG]*[2], Prafulla Regmi[1], Cara Robison[2], Kaylee Montney[2], Darrin M. Karcher[3]
[1]Department of Poultry Science, North Carolina State University, Raleigh, North Carolina, United States, [2]Department of Animal Science, Michigan State University, East Lansing, Michigan, United States, [3]Department of Animal Science, Purdue University, West Lafayette, Indiana, United States

33 **Automatic detection of reproductive behavior in male Japanese quail (*Coturnix japonica*) using accelerometers and neural networks.**

Catalina Simian[1, 2], Lucas M. Barberis[3], Raul H. Marin*[1, 2], Jackelyn M. Kembro[1, 2]
[1]Universidad Nacional de Córdoba, Facultad de Ciencias Exactas, Físicas y Naturales, Instituto de Ciencia y Tecnología de los Alimentos (ICTA) and Cátedra de Química Biológica, Cordoba, Argentina, [2]Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Instituto de Investigaciones Biológicas y Tecnológicas (IIByT, CONICET-UNC), Cordoba, Argentina, [3]Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Instituto de Física Enrique Gaviola (IFEG, CONICET-UNC), Cordoba, Argentina

34 **A machine vision-based method for monitoring broiler floor distribution in feeding and drinking zones.**

Yangyang Guo[GS]*[1, 2], Lilong Chai[1], Samuel Aggrey[1], Adelumola Oladeinde[1, 3], Jasmine Johnson[1]
[1]Poultry Science, University of Georgia, Athens, Georgia, United States, [2]College of Mechanical and Electronic Engineering, Northwest A&F University, Yangling, Shaanxi, China, [3]U.S. National Poultry Research Center, USDA ARS, Athens, Georgia, United States

Extension and Instruction
Chair: Dawn Koltes, Iowa State University
Virtual Session Room II

35 **Writing assignments in undergraduate poultry production curricula.**
Ruediger Hauck*[1,2], Amit Morey[2], Emefa A. Monu[2], Christopher Basgier[3], Amy N. Wright[4]
[1]Department of Pathobiology, Auburn University, Auburn, Alabama, United States, [2]Department of Poultry Science, Auburn University, Auburn, Alabama, United States, [5]Office of University Writing, Auburn University, Auburn, Alabama, United States, [4]Department of Horticulture, Auburn University, Auburn, Alabama, United States

36 **The Elementary E.G.G. Program: Impacting student interest through poultry science STEM- curriculum.**
Danielle Marks[GS]*, Elizabeth Karcher
Animal Sciences, Purdue University, West Lafayette, Indiana, United States

37 **Poultry Products: An on-line undergraduate course**.
Glenn Birrenkott*, Richelle Miller
Animal & Veterinary Sciences, Clemson University, Clemson, South Carolina, United States

38 **Transitioning an upper level poultry management course from in-person to online instruction during the COVID-19 outbreak.**
Jacquline Jacob*, Anthony Pescatore, Sunday Adedokun
Animal and Food Sciences, University of Kentucky, Lexington, Kentucky, United States

39 **Measuring interest and engagement in Extension programming.**
Ashley Rosenkrans[UG]*, Danielle Marks, Darrin M. Karcher, Elizabeth Karcher
Animal Sciences, Purdue University, West Lafayette, Indiana, United States

40 **Promotion of small-scale poultry farming through university extension in northern Rio de Janeiro, Brazil.**
Karoll A. Torres-Cordido[1], Samuel d. Rocha[GS]*[3], Marize Bastos de Matos[2], Luiz Eduardo de Campos Crespo[1], Geraldo Márcio Timóteo[3], Juan Carlos P. Quintero[1]
[1]CCTA, Norte Fluminense State University, Campos dos Goytacazes, RJ, Brazil, [2]Cambuci, Fluminense Federal Institute, Cambuci, RJ, Brazil, [3]CCH, Norte Fluminense State University, Campos dos Goytacazes, RJ, Brazil

41 **Evaluating the causes of arthritis condemnation in a Brazilian slaughterhouse.**
Thais R. Pereira[2], Elisa P. Francois[GS]*[1], Ismael Franca[3]
[1]Zootecnia, UFRGS, Porto Alegre, Rio Grande do Sul, Brazil, [2]Quality Assurance, Carrer Alimentos Ltda., Garibaldi, Rio Grande do Sul, Brazil, [3]Agronomia, UFRGS, Porto Alegre, Rio Grande do Sul, Brazil

42 **Possibilities for formulating layer diets beyond the traditional least-cost model.**
Amy F. Moss*[1], Greg Parkinson[4], T. M. Crowley[2, 3], Gene M. Pesti[1]
[1]University of New England, Armidale, New South Wales, Australia, [2]Poultry Hub Australia, University of New England, Armidale, New South Wales, Australia, [3]School of Medicine, Deakin University, Geelong, Victoria, Australia, [4]Livorno Consulting, Brunswick, Victoria, Australia

43 **Smallholder farmer community-based breeding program of indigenous chickens key toin- situ genetic resource conservation and enhancing rural livelihoods in Zambia**.
Christopher M. Kanyama[GS]*[1], Amy F. Moss[1], TM Crowley[2]
[1]University of New England, Armidale, New South Wales, Australia, [2]Poultry Hub Australia, University of New England, Armidale, New South Wales, Australia

Genetics and Molecular Biology

Chair: Robert B. Beckstead, North Carolina State University

Virtual Session Room III

44 **Comprehensive analysis of circular RNAs related to hypoxic adaptation in the Tibetan chicken.**
Ying Zhang[GS*1,2], Woo Kim[2], Woyu Su[1], Hao Zhang[1]
[1]China Agricultural University, Beijing, China, [2]University of Georgia, Athens, Georgia, United States

45 **The genetic basis of the response of Tanzanian local chicken ecotypes to velogenic Newcastle disease virus.**
Muhammed Walugembe*[1], Esther Mollel[2], James Mushi[2], Gaspar Chiwanga[2], Peter Msoffe[2], Ying Wang[3], Nadira Chouicha[3], Terra Kelly[3,4], Rodrigo Gallardo[4], Huaijun Zhou[3], Amandus Muhairwa[2], Susan Lamont[1], Jack Dekkers[1]
[1]Animal Science , Iowa State University, Ames, Iowa, United States, [2]Department of Veterinary Medicine and Public Health, Sokoine University of Agriculture, Morogoro, Tanzania, United Republic of, [3]Animal Science, University of California Davis, Davis, California, United States, [4]School of Veterinary Medicine, University of California, Davis, California, United States

46 **Discriminant and factor analysis of four strains of finisher broiler chickens.**
Demilade I. Ibiwoye[GS*], Foluke E. Sola-Ojo
Department of Animal Production, University of Ilorin, Ilorin, Kwara, Nigeria

47 **Sirtuin genes are dynamically regulate during adipose development in broiler chicks.**
Heather Winter[UG*1], Robert Mihelic[1], Suchita Das[1], Kurt Lamour[2], Brynn H. Voy[1]
[1]Animal Science, University of Tennessee, Knoxville, Tennessee, United States, [2]Entomology and Plant Pathology, University of Tennessee, Knoxville, Tennessee, United States

48 **Developmental expression of genes within the insulin-like growth factor system suggests they play unique roles in regulating breast muscle myogenesis and growth.**
Lauren A. Vaccaro[GS*], Emma England, Abigail M. Wilson, Laura Ellestad
Poultry Science, University of Georgia, Athens, Georgia, United States

49 **RNA sequencing identifies differential gene expression in broiler breeders managed on different feeding programs.**
Chandler Keck[GS*1], Martin J. Zuidhof[2], Nicole Zukiwsky[2], Mohammad Afrouziyeh[2], Chris Ashwell[1]
[1]North Carolina State University, Raleigh, North Carolina, United States, [2]University of Alberta, Edmonton, Alberta, Canada

50 **Effects of maternal immunization against myostatin on the post-hatch growth performance of their chicks.**
Rajeev K. Mishra[GS*], Rajesh Jha, Birendra Mishra, Yong-Soo Kim
Human Nutrition, Food and Animal Sciences, University of Hawaii at Manoa, Honolulu, Hawaii, United States

51 **Heat stress dysregulates intestinal mitochondrial function and dynamics in broilers.**
Reagan N. Cauble[GS*], Elizabeth Greene, Sami Dridi
Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States

52 **Profiling of miRNA:target pairings associated with metabolic and immunological processes in the adipose tissue in late-stage embryos and early post-hatch chicks.**
Julie Hicks*, Hsiao-Ching Liu
North Carolina State University, Raleigh, North Carolina, United States

53 **Genetic relationship between perching and frequency of floor eggs in brown layers.**
Anna Wolc*[1,2], Petek Settar[2], Janet Fulton[2], Jesus Arango[2], Kaylee Rowland[2], Danny Lubritz[2], Jack Dekkers[1]
[1]Animal Science, Iowa State University, Ames, Iowa, United States, [2]Research and Development, Hy-Line International, Dallas Center, Iowa, United States

Immunology, Health and Disease
Chair: Audrey P. McElroy, Texas A&M University
Virtual Session Room IV

54 **Impacts of antibiotic reduction strategies on zootechnical performances, health control and *Eimeria* spp. oocysts excretion compared to conventional antibiotic programs in commercial broiler chicken flocks.**
Eric Parent[GS*1,2], Marie Archambault[1,2], Robert J. Moore[3], Martine Boulianne[1,2]
[1]Faculté de médecine vétérinaire, Université de Montréal, St-Hyacinthe, Quebec, Canada, [2]Centre de Recherche en Infectiologie Porcine et Avicole (CRIPA-FRQNT), Université de Montréal, St- Hyacinthe, Quebec, Canada, [3]School of Science, RMIT University, Bundoora, Victoria, Australia

55 **A field study to evaluate the efficacy and safety of Panacur® AquaSol for use in drinking water for the treatment of chickens naturally infected with *Capillaria* spp.**
Rafael Chiummo*[1], Kevin Wilkinson[1], Katharina Raue[2], Christina Strube[2], Emmanuel Thomas[1]
[1]MSD Animal Health Innovation GmbH, Schwabenheim, Germany, [2]Institute for Parasitology, Centre for Infection Medicine, University of Veterinary Medicine Hannover, Hannover, Germany

56 **Graded *Eimeria* infection regulates oxidative stress in broiler chickens and is strongly correlated with growth performance and gut health parameters.**
Po-Yun Teng[GS*], Yuguo H. Tompkins, Sudhir Yadav, Fernanda Castro, Allberta L. Fuller, Woo Kim
Poultry Science, University of Georgia, Athens, Georgia, United States

57 **A temporal investigation of host defense peptide expression and intestinal homeostasis in broiler chickens following a single infection with *Eimeria acervulina*.**
Sara Cloft[GS*1], Kate Miska[2], Eric Wong[1]
[1]Animal and Poultry Sciences, Virginia Tech, Blacksburg, Virginia, United States, [2]Animal Bioscience and Biotechnology Laboratory, USDA ARS, Beltsville, Maryland, United States

58 **Evaluation of coccidial lesions in the ceca of broilers challenged with Eimeria tenella using digital image analysis.**
Ashlyn Snyder[GS*1], Kate Miska[2], Cara Robison[3], Shawna L. Weimer[1]
[1]Animal and Avian Sciences, University of Maryland, College Park, Maryland, United States, [2]USDA-ARS, Beltsville, Maryland, United States, [3]Michigan State University, East Lansing, Michigan, United States

59 **Immunomodulation using a dried egg product during a severe *Eimeria* challenge in broiler chickens.**
Muhammed Shameer Abdul Rasheed[GS*1], Utsav Tiwari[1], Maci L. Oelschlager[1], Brooke N. Smith[1], Juliana Jespersen[1], Nannette Olmeda-Geniec[2], Jeffery Escobar[2], Ryan Dilger[1]
[1]Department of Animal Science, University of Illinois, Urbana, Illinois, United States, [2]Elanco Animal Health, Greenfield, Indiana, United States

60 **Algae-based feed ingredient improves intestinal physiology and alters systemic immunity in broiler chickens during coccidiosis challenge.**
Krysten Fries-Craft[GS*], Elizabeth A. Bobeck
Animal Science, Iowa State University, Ames, Iowa, United States

61 **Effects of antibiotic and probiotic feed additives on growth performance of *Eimeria* infected broilers.**
Linan Jia[GS*]
Poultry Science, Mississippi State University, Starkville, Mississippi, United States

62 **Changes in the ceca microbiota of broilers vaccinated for coccidiosis or supplemented with salinomycin.**
Catiane Orso[GS*2], Bruna S. Cony[2], Jessica P. Silva[2], Julio C. V. Furtado[2], Bruna Schroeder[2], Ana . P.G. Frazzon[1], Ines Andretta[2], Andréa M. L. Ribeiro[2]
[1]Microbiology, UFRGS, Porto Alegre, RS, Brazil, [2]Animal Science, UFRGS, Porto Alegre, RS, Brazil

63 **Evaluation of the interaction between *Eimeria adenoeides* or *E. tenella* with *Histomonas meleagridis* in poults.**

Thaina L. Barros[GS*1], John Barta[2], Billy M. Hargis[1], Christine Vuong[1]
[1]*Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States,* [2]*Ontario Veterinary College, Department of Pathobiology, University of Guelph, Guelph, Ontario, Canada*

64 **The importance of an *in vivo* model to confirm *Clostridium perfringens* strains pathogenicity.**

Nicolas Deslauriers[GS*1], Lila Maduro[1], Éloïse Denis[1], Eric Parent[2], Martine Boulianne[3]
[1]*Faculté de médecine vétérinaire, Département Sciences cliniques, Université de Montréal, Saint- Hyacinthe, Quebec, Canada,* [2]*Faculté de médecine vétérinaire, Université de Montréal, St-Hyacinthe, Ontario, Canada,* [3]*Clinical Sciences, Faculté de médecine vétérinaire, Université de Montréal, St.Hyacinthe, Quebec, Canada*

65 **Mammalian target of rapamycin signaling modulates chicken necrotic enteritis.**

Mohit Bansal[GS*1], Ying Fu[2], Ayidh Almansour[2], Tahrir Aleneji[2], Mussie T. Abraha[1], Danielle Graham[1], Anamika Gupta[1], Hong Wang[1], Billy M. Hargis[1], Xiaolun Sun[1]
[1]*Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States,* [2]*Cell and Molecular Biology & Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States*

66 **Evaluation of plant polyphenols (Silvafeed® Nutri P Plant Bioactives) in the diet ofbroilers during a controlled necrotic enteritis challenge.**

Matthew K. Jones*[1], Charles L. Hofacre[1], Mariano Fernández Miyakawa[2], Ernie E. Pierson[4], Michele Battaglia[3]
[1]*Southern Poultry Research Group, Watkinsville, Georgia, United States,* [2]*Consejo Nacional de Investigaciones Científicas y Técnicas, Buenos Aires, Argentina,* [3]*Silvateam, San Michele Mondovì, Italy,* [4]*The Pierson Consulting Group, St. Louis, Missouri, United States*

67 **Necrotic enteritis model to achieve mortality reflective of industry.**

Audrey F. Duff[GS*1], Kaylin Chasser[1], Whitney Briggs[1], Johel Bielke[1], Shelby Ramirez[2], Antonia Tacconi[3], G. R. Murugesan[2], Lisa Bielke[1]
[1]*Animal Sciences, The Ohio State University, Wooster, Ohio, United States,* [2]*BIOMIN America Inc., Overland Park, Kansas, United States,* [3]*BIOMIN Holding GmbH, Getzersdorf, Austria*

68 **Evaluation of bile acids against chicken necrotic enteritis.**

Mohit Bansal[GS*1], Ying Fu[2], Ayidh Almansour[2], Mussie T. Abraha[1], Tahrir Aleneji[2], Danielle Graham[1], Anamika Gupta[1], Hong Wang[1], Rohana Liyanage[3], Billy M. Hargis[1], Xiaolun Sun[1]
[1]*Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States,* [2]*Cell and Molecular Biology & Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States,* [3]*Chemistry and Biochemistry, University of Arkansas, Fayetteville, Arkansas, United States*

69 ***Clostridium perfringens* vaccine prevents chicken necrotic enteritis.**

Ying Fu[GS*1], Mohit Bansal[2], Ayidh Almansour[1], Tahrir Alenezi[1], Mussie T. Abraha[2], Hong Wang[2], Danielle Graham[2], Billy M. Hargis[2], Xiaolun Sun[1]
[1]*Cell and Molecular Biology & Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States,* [2]*Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States*

70 **Mucosal immunity of broilers vaccinated with an oral polyanhydride-nanoparticle based *Clostridium perfringens* vaccine expressing *Salmonella enterica* flagella.**

Nour Ramadan[GS*1], Gabriel Akerele[1], Sankar Renu[2], Renukaradhya Gourapura[2], Ramesh Selvaraj[1]
[1]*Poultry Science, University of Georgia, Athens, Georgia, United States,* [2]*Food Animal Health, Ohio state university, Wooster, Ohio, United States*

71 **Direct evidence for the production of an adhesive pilus by *Clostridium perfringens* that is required for the pathogenesis of necrotic enteritis in poultry.**

Dion Lepp*[1], Yuanyuan Zhou[1,3], Shivani Ojha[2], Iman Mehdizadeh Gohari[2], Jason Carere[1], Chengbo Yang[3], John F. Prescott[2], Joshua Gong[1]
[1]*Guelph Research and Development Centre, Agriculture and Agri-Food Canada, Guelph, Ontario, Canada,* [2]*Dept of Pathobiology, University of Guelph, Guelph, Ontario, Canada,* [3]*Dept of Animal Science, University of Manitoba,*

Winnipeg, Manitoba, Canada

72 **PilR/PilS two-component and Agr-like quorum sensing systems regulate pilin production and binding of *Clostridium perfringens* to collagen.**
Yuanyuan Zhou[GS*1, 2], Dion Lepp[1], Jason Carere[1], Hai Yu[1], Chengbo Yang[2], Joshua Gong[1]
[1]Guelph Research and Development Centre, Agriculture and Agri-Food Canada, Guelph, Ontario, Canada, [2]Department of Animal Science, University of Manitoba, Winnipeg, Manitoba, Canada

73 **Evaluation of protection of ND vaccination regimes against early challenge with Velogenic Newcastle virus-VII.1.**
Wael K. Elfeil*[1], Mohamed Rady[2], Ahmed Sedeik[2], Magdy Elkady[3], Magdy Elsayed[4, 5]
[1]Veterinary Medicine, Suez Canal university, Ismailia, Ismailia, Egypt, [2]Animal Health Research Institute, Agriculture Research Center, Giza, Egypt, [3]Veterinary Medicine, Beni Suef University, Beni Suef, Beni Suef, Egypt, [4]Veterinary Medicine, Cairo University, Cairo, Egypt, [5]Research and Development, MEVAC for Veterinary Vaccine, El-Salhiya El-Gededa, El-Sharkia, Egypt

74 **Evaluation of protection of H5 vaccination regimes against early challenge with HPAI-H5N1 on commercial broiler chickens.**
Wael K. Elfeil*[1], Mohamed Rady[2], Magdy Elkady[3], Magdy Elsayed[4, 5]
[1]Veterinary Medicine, Suez Canal university, Ismailia, Ismailia, Egypt, [2]Faculty of Veterinary Medicine, Alexandria University, Alexandria, Alexandria, Egypt, [3]Veterinary Medicine, Beni Suef University, Beni Suef, Beni Suef, Egypt, [4]Veterinary Medicine, Cairo University, Cairo, Egypt, [5]Research and Development, MEVAC for Veterinary vaccine, El-Salhiya El-Gededa, El-Sharkia, Egypt

75 **Evaluating the infection potential of field prevailing Newcastle disease virus and Infectious Bronchitis virus along with associated microscopic changes in commercial poultry.**
Muhammad Saeed Imran*[1], Asim Aslam[1], Tahir Yaqub[2], Muhammad Yasin Tipu[1]
[1]Pathology, University of Veterinary and Animal Sciences Lahore, Lahore, Punjab, Pakistan, [2]Microbiology, University of Veterinary and Animal Sciences, Lahore, Punjab, Pakistan

76 **The role of folic acid on the antiviral innate immune pathways' in chicken B lymphocytes infected with IBDV.**
Santiago Uribe-Diaz[GS*1], Alexander Yitbarek[2], Daniela Losada-Medina[1], Marya Ahmed[1], Juan Carlos Rodriguez-Lecompte[1]
[1]University of Prince Edward Island, Charlottetown, Prince Edward Island, Canada, [2]University of Guelph, Guelph, Ontario, Canada

77 **Environment affects the intestinal microbiota of broiler chicks.**
Martine Boulianne*[2], Laura Franco[1], Marcio Costa[1]
[1]Pathology and microbiology, Faculté de médecine vétérinaire, Université de Montréal, St.Hyacinthe, Quebec, Canada, [2]Clinical Sciences, Faculté de médecine vétérinaire, Université de Montréal, St.Hyacinthe, Quebec, Canada

78 **Effects of xylanase and xylooligosaccharides supplementation on productive performance and gut health variables of broilers.**
Amit K. Singh*[1], Birendra Mishra[1], Mike Bedford[2], Rajesh Jha[1]
[1]Human Nutrition, Food and Animal Sciences, University of Hawaii at Manoa, Honolulu, Hawaii, United States, [2]AB Vista Feed Ingredients, Marlborough, Wiltshire, United Kingdom

79 **Effect of NSPase enzyme and residual fiber from digested feed on cecal short chain fatty acids production and cecal microbiota diversity in broilers, studied in vitro.**
Amit K. Singh*[1], Joshua Legaspi[1, 2], Timothy Park[1, 2], Kabi Neupane[2], Rajesh Jha[1]
[1]Human Nutrition, Food and Animal Sciences, University of Hawaii at Manoa, Honolulu, Hawaii, United States, [2]Leeward Community College, University of Hawaii, Pearl City, Hawaii, United States

80 **Effects of *in ovo* inoculation of chicken embryos with chitooligosaccharide and chlorella polysaccharide on the gut health parameters of broiler chickens.**
Jiachao Zhang[1,2], Kun Cai[2], Rajeev K. Mishra[1], Rajesh Jha*[1]
[1]*Human Nutrition, Food and Animal Sciences, University of Hawaii at Manoa, Honolulu, Hawaii, United States,* [2]*College of Food Science and Technology, Hainan University, Haikou, Hainan , China*

81 **Probiotic cocktail accelerates the succession of ileal microbiota and trajectory of intestinal development in broiler chickens.**
Dazhi Tang[UG]*, Bochen Song, Tahir Mahmood, Peng Li, Yuming Guo
College of Animal Science and Technology, China Agriculture University, Beijing, China

82 **Effects of dietary supplementation of probiotics on immune function and ileal microorganisms in caged broiler chicks.**
Bochen Song[GS*1], Dazhi Tang[2], Hao Fan[1], Liping Gan[1], Shaojia Yan[1], Guang Li[1], Peng Li[1], Shengyu Zhou[1], Yuming Guo[1]
[1]*College of Animal Science and Technology, China Agricultural University, Beijing, China,* [2]*College of Animal Science and Technology, China Agriculture University, Beijing, China*

83 **Efficacy of *Pleurotus ostreatus* (oyster mushroom) extracts and isolated proteins in the production profile, oxidative stress and immunity of the broiler birds.**
Haseeb Anwar*, Ghulam Hussain, Imtiaz Mustafa
Physiology, Government College University, Faisalabad, Punjab, Pakistan

84 **Egg yolk antibodies: A novel anti-diarrheal food ingredient.**
Jill W. Skrobarczyk[GS*1], Cameron L. Martin[1], Mohammed Alabdali[1], Sohini Bhatia[1], Suresh Pillai[1,2], Luc R. Berghman[1]
[1]*Poultry Science, Texas A&M University, College Station, Texas, United States,* [2]*National Center for Electron Beam Research, Texas A&M University, College Station, Texas, United States*

85 **A survey of gastrointestinal microbiota on commercial poultry farms in 4 countries in Latin America.**
Anne Ballou*[1], Andrés Vásquez[2], Kevin Garcia[2]
[1]*Iluma Innovation Labs, Durham, North Carolina, United States,* [2]*Biological Engineering, Universidad Nacional de Colombia, Medellín, Colombia*

86 **Characterizing the immune response of broilers to *Campylobacter jejuni*.**
Mohamad Mortada[GS*1], Douglas E. Cosby[2], Ramesh Selvaraj[1]
[1]*Department of Poultry Science, The University of Georgia, Athens, Georgia, United States,* [2]*Poultry Microbiological Safety and Processing Research Unit, USDA-ARS, Athens, Georgia, United States*

87 **The development of immune system and function of broiler chicks in laminated cages.**
Bochen Song[GS*1], Dazhi Tang[1], Hao Fan[1,2], Liping Gan[1], Shaojia Yan[1], Guang Li[1], Peng Li[1], Yuming Guo[1]
[1]*College of Animal Science and Technology, China Agricultural University, Beijing, Beijing, China,* [2]*Emory University, Atlanta, Georgia, United States*

88 **Modeling broiler industry loss to estimate the value potential of tracking the global burden of animal diseases.**
Kevin L. Watkins*[1,2], Stephanie Rutten-Ramos[3], Benjamin Huntington[2]
[1]*FoodFirst, LLC, Indianapolis, Indiana, United States,* [2]*University of Liverpool, Liverpool, United Kingdom,* [3]*Elanco Animal Health, Greenfield, Indiana, United States*

89 **Candidate Gene for Chicken Alloantigen *A*.**
Robert L. Taylor*[1], Wioleta Drobik-Czwarno[3], Janet Fulton[2]
[1]*Division of Animal and Nutritional Sciences, West Virginia University, Morgantown, West Virginia, United States,* [2]*Hy-Line International, Dallas Center, Iowa, United States,* [3]*Department of Animal Genetics and Conservation, Warsaw University of Life Sciences, Warsaw, Poland*

90 **Protective efficacy of chitosan nanoparticles loaded with *C. perfringens* extracellularproteins and *Salmonella* Enteritidis flagellar proteins.**
Gabriel O. Akerele[GS*1], Nour Ramadan[2], Sankar Renu[3], Renukaradhya Gourapura[3], Revathi Shanmugasundaram[1], Ramesh Selvaraj[1]
[1]Poultry Science, University of Georgia, Athens, Georgia, United States, [2]Poultry Science, University of Georgia, Athens, Georgia, United States, [3]Food Animal Health Research Program, Ohio Agricultural Research and Development Center, Ohio State University, Wooster-44691, Ohio state University, Wooster, Ohio, United States

91 ***In-ovo* administration of a *Salmonella*-chitosan nanoparticle vaccine on broilers challenged with *Salmonella* Enteritidis.**
Keila Y. Acevedo-Villanueva[GS*1], Sankar Renu[2, 3], Renukaradhya Gourapura[2], Ramesh Selvaraj[1]
[1]Poultry Science, University of Georgia, Athens, Georgia, United States, [2]Food Animal Research Program, The Ohio State University, Wooster, Ohio, United States, [3]Department Of Veterinary Preventive Medicine, The Ohio State University, Columbus, Ohio, United States

92 **Day of hatch exposure to *Enterobacteriaceae* and characterization of avian pathogenic *E. coli*on inflammation.**
Kaylin Chasser[GS*], Audrey F. Duff, Whitney Briggs, Kate McGovern, Johel Bielke, Lisa Bielke
Animal Sciences, Ohio State University, Columbus, Ohio, United States

93 **Enhancement of host defense peptide gene expression and disease resistance by butyrate, forskolin, and lactose in broiler chickens.**
Qing Yang[GS*], Melanie Whitmore, Sydney Stewart, Kelsy Robinson, Glenn Zhang
Animal and Food Sciences, Oklahoma State University, Stillwater, Oklahoma, United States

94 **Effect of supplementation of a protected complex of biofactors and antioxidants inbroiler chickens undergoing early life stress.**
Cristiano Bortoluzzi*[1], Ludovic Lahaye[2], Krystel Marcil[2], Catherine Chaput[2], Michael H. Kogut[3], Elizabeth Santin[2]
[1]Poultry Science, Texas A&M Agrilife Research, College Station, Texas, United States, [2]Jefo Nutrition Inc., Saint-Hyacinthe, Quebec, Canada, [3]USDA-ARS, Southern Plains Agricultural Research Center, College Station, Texas, United States

95 **Ulvans activates avian monocytes and neutrophils.**
Nathalie Guriec[2], Frédérick Bussy[1], Maria Garcia*[1], Maria Angeles Rodriguez[1], Benoît Quéro[3], Matthieu Le Goff[1], Pi Nyvall-Collen[1]
[1]Olmix Group, Brehan, France, [2]Brest University & Brest Medical School, Brest, France, [3]R&D Breizh, Pluméliau, France

96 **The use of a direct ELISA to identify Blackhead resistant turkeys.**
Christina S. Sigmon*, Alessandro Ferrarini, Robert Beckstead
Prestage Department of Poultry Science, North Carolina State University, Raleigh, North Carolina, United States

97 ***In ovo* gamma-tocopherol vitamin E reduced the incidence of deep pectoral myopathy (green muscle disease) in broilers.**
Lizza Macalintal*[1], Anthony Pescatore[1], Michael Ford[1], Merlin Lindemann[1], Tuoying Ao[2]
[1]University of Kentucky, Lexington, Kentucky, United States, [2]Alltech, Inc., Nicholasville, Kentucky, United States

98 **The effects of a mixture of betaine, vitamin C, St John's wort (Hypericum perforatum L.), lavender, and Melissa officinalis on some blood biochemical indices, triiodothyronine (T_3), and corticosterone in broiler chickens exposed to heat stress.**
Hamid Reza Behboodi[2], Asghar Sedaghat*[1], Atefeh Baradaran[2]
[1]Poultry Science, Tarbiat Modares University, Ahram, Bushehr, Iran (the Islamic Republic of), [2]Department of Animal Physiology, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran (the Islamic Republic of)

Management and Production
Chair: Jonathan Moyle, University of Maryland
Virtual Session Room V

99 **A survey on sustainable development of the Chantecler chicken breed.**
Jean-Marc Larivière*
Institut de technologie agroalimentaire, La Pocatière, Quebec, Canada

100 **Relationship among egg weight and live weight traits in Creole chickens of Mexico.**
José G. Reyes-Bello[UG*1], Oliver J. Juárez-Beltrán[1], Leonardo Osio-Orihuela[1], Osvaldo Fernández- Ipiña[1], Diego Zárate-Contreras[2], Arturo Pro-Martínez[2], Juan M. Cuca-García[2], Leodán T. Rodríguez- Ortega[3], Fernando González-Cerón[1]
[1]Department of Animal Science, Chapingo Autonomous University, Texcoco, State of Mexico, Mexico, [2]Livestock Program, College of Postgraduates Campus Montecillo, Texcoco, State of Mexico, Mexico, [3]Polytechnic University of Francisco I. Madero, Francisco I. Madero, Hidalgo, Mexico

101 **The effect of housing environment on commercial white egg layer performance.**
Benjamin N. Alig[GS*], Peter R. Ferket, Ramon Malheiros, Kenneth E. Anderson
Prestage Department of Poultry Science, North Carolina State University, Raleigh, North Carolina, United States

102 **Changes in production parameters, egg qualities, fecal volatile fatty acids, and nutrient digestibility in laying hens exposed heat stress.**
Da-Hye Kim[GS*], Yoo Bhin Kim, Sang Hyeok Lee, Kyung-Woo Lee
Konkuk University, Seoul, Korea (the Republic of)

103 **The effect of housing environment and hen age on white shell egg solids and quality.**
Kenneth E. Anderson*, Benjamin N. Alig, Peter R. Ferket, Ramon Malheiros
Prestage Department of Poultry Science, North Carolina State University, Raleigh, North Carolina, United States

104 **The effect of housing environment on egg quality and solids of commercial brown egg layers.**
Benjamin N. Alig[GS*], Peter R. Ferket, Ramon Malheiros, Kenneth E. Anderson
Prestage Department of Poultry Science, North Carolina State University, Wake Forest, North Carolina, United States

105 **Prevalence of avian pathogenic *Escherichia coli* in cage-free W-36 pullets reared under monochromatic blue and normal LED lights.**
Ishab Poudel[GS*], Nikhil Nuthalapati, Anuraj Sukumaran, Li Zhang, Mary Beck, Aaron Kiess, Pratima Adhikari
Poultry Science, Mississippi State University, Starkville, Mississippi, United States

106 **A northern fowl mite infestation impacts cage-free layer performance and welfare between 17 and 49 weeks of age.**
Rachel Jarrett*[1], Darrin M. Karcher[1], Marisa Erasmus[1], Deana R. Jones[2], Kailynn Scoles[1], Amy Murillo[3]
[1]Animal Sciences, Purdue University, West Lafayette, Indiana, United States, [2]US National Poultry Research Center, Egg Safety and Quality Research Unit, USDA Agricultural Research Service, Athens, Georgia, United States, [3]Entomology, University of California Riverside, Riverside, California, United States

107 **Quantifying sex and line differences in growth parameters in turkeys.**
Sasha van der Klein*[1], Owen Willems[1], Martin J. Zuidhof[2]
[1]R&D, Hendrix Genetics, Kitchener, Ontario, Canada, [2]University of Alberta, Edmonton, Alberta, Canada

108 **Frequency of data collection on the estimation of parameters of the Gompertz model to describe the growth of Creole chickens of Mexico.**
Diego Zárate-Contreras[UG*1], Fernando González-Cerón[2], Juan M. Cuca-García[1], Arturo Pro-Martínez[1], Gustavo Ramírez-Valverde[1], Omar Hernández-Mendo[1], Jaime Gallegos-Sánchez[1], Josafhat Salinas- Ruiz[3], Rosalía Ordaz-Contreras[1], Miguel Á. Matus-Aragón[1], Artemio J. Vargas-Galicia[1]
[1]Livestock Program, College of Postgraduates Campus Montecillo, Texcoco, State of Mexico, Mexico, [2]Department

of Animal Science, Chapingo Autonomous University, Texcoco, State of Mexico, Mexico, [3]College of Postgraduates Campus Cordoba, Cordoba, Veracruz , Mexico

109 **Effects of maternal growth pattern on broiler chicken performance and carcasstraits.**
Mohammad Afrouziyeh[GS]*, Nicole Zukiwsky, Martin J. Zuidhof
University of Alberta, Edmonton, Alberta, Canada

110 **Comparison of a traditional female diet to a hen diet with organic zinc on roostersemen quality and reproductive performance.**
Kelly M. Sweeney[GS]*[1], Drew Benson[1], Carla Aranibar[1], Monique Franca[2], Benton Hudson[3], Duarte Neves[4], Santiago Garcia-Gomora[5], Jeanna Wilson[1]
[1]Poultry Science, University of Georgia, Athens, Georgia, Georgia, [2]Population Health, University of Georgia, Athens, Georgia, United States, [3]Aviagen Inc., Huntsville, Alabama, United States, [4]Zinpro Corp., Eden Prairie, Minnesota, United States, [5]Departamento de Medicina y Zootecnia de Aves, Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México, Mexico City, Mexico

111 **Effect of heat treatment during storage on initial stages of duck embryo development.**
Serdar Özlü*[1], Carlos Eduardo Bites Romanini[2], Roger Banwell[2], Okan Elibol[1]
[1]Department of Animal Science, Faculty of Agriculture, Ankara University, Ankara, Turkey, [2]Petersime NV, Belgium

112 **The preference of nest boxes on either raised slats or the floor in broilerbreeders.**
Laura Candelotto[GS]*[1], Anne van den Oever[2, 3], Yamenah Gómez[1], Michael J. Toscano[1]
[1]ZTHZ, Division of Animal Welfare, VPH Institute, University of Bern, Zollikofen, Switzerland, [2]Adaptation Physiology Group, Wageningen University, Wageningen, Netherlands, [3]Vencomatic Group, Eersel, Netherlands

113 **Hatchability and embryo mortality of birds provided red, white, or blue LED lightduring incubation.**
Janessa Henry[GS]*, Bruce Rathgeber, Nancy McLean, Xujie Li, Janice MacIsaac
Dalhousie University, Truro, Nova Scotia, Canada

114 **Effects of reduced incubation temperature starting at 12 days of incubation on post-hatch broiler performance.**
Katie E. Elliott*, Ethan Dehart, Saman Fatemi, Abdul Mohssen Alqhtani, Ayoub Mousstaaid, Kayla Bannister, Wei Zhai, David Peebles
Poultry Science, Mississippi State University, Starkville, Mississippi, United States

115 **The impacts of graded levels of stocking density on the performance, health, and welfare of turkey hens to 11 weeks of age.**
Sameeha Jhetam[GS]*, Kailyn Beaulac, Karen Schwean-Lardner
Animal and Poultry Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada,

116 **Dietary additives, coccidiosis and Fenbendazole treatment alter fecal moisture to various degrees in turkey poults.**
Elle Chadwick[GS]*, Robert Beckstead
Prestage Department of Poultry Science, North Carolina State University, Raleigh, North Carolina, United States

117 **Comparing litter to partially slotted flooring materials on tom turkey performance and litter moisture.**
Mariah M. Huberty[GS]*[1], Jeanine A. Brannon[1], Kevin Janni[2], Carol Cardona[3], Sally L. Noll[1]
[1]Department of Animal Science, University of Minnesota, Saint Paul, Minnesota, United States, [2]Department of Bioproducts and Biosystems Engineering, University of Minnesota, Saint Paul, Minnesota, United States, [3]Department of Veterinary and Biomedical Sciences, University of Minnesota, Saint Paul, Minnesota, United States

118 **Mitigating disease and reducing potential for cross-contamination in commercial flocks using robotics.**
Colin Usher*
Aerospace Transportation Advanced Systems Lab Food Processing Technology Division, Georgia Tech Research Institute, Atlanta, Georgia, United States

119 **Bedding and stocking density influenced the relationship of litter characteristics to footpad dermatitis in market turkey hens.**

Gabriella Furo[GS*1], Carol Cardona[2], Yuzhi Li[3], Michael R. Hulet[4], Kevin Janni[5], Sally L. Noll[1]
[1]Animal Science, University of Minnesota, Debrecen, Hungary, [2]Department of Veterinary and Biomedical Sciences, University of Minnesota, Saint Paul, Minnesota, United States, [3]West Central Research and Outreach Center, University of Minnesota, Morris, Minnesota, United States, [4]Department of Animal Science, Pennsylvania State University, University Park, Pennsylvania, United States, [5]Department of Bioproducts and Biosystems Engineering, University of Minnesota, Saint Paul, Minnesota, United States

120 **Examination of poultry litter as a potential source for airborne pathogens.**

Amrit Pal[GS]*, Matthew Bailey, Aidan A. Talorico, James Krehling, Kenneth Macklin, Dianna Bourassa
Poultry Science, Auburn University, Auburn, Alabama, United States

121 **Evaluation of pulsed application of a water-administered *Bacillus* sp. fermentation product (Gamaxine) with and without antibiotic administration on broiler production parameters.**

Maria K. Dashek*[1], Jeffrey W. Hall[2], Sherry L. Layton[1, 2]
[1]BV Science, Lake St Louis, Missouri, United States, [2]Vetanco USA, Lenexa, Kansas, United States

122 **Improving broilers' feed efficiency by dietary supplementation of a characterized naturalcitrus extract.**

Sekhou Cisse[GS*1, 2], Assia Boumezrag[3], Roxanne Cornet[2], Hoa Bui[1, 2], Mohamed el amine Benarbia[1, 2], David Guilet[2]
[1]R&D, Nor-Feed SAS, Angers, Maine et Loire, France, [2]R&D, Joint Lab ANR FeedInTech, Beaucouzé, Maine et Loire, France, [3]R&D, University of Tiaret, Tiaret, Algeria

123 **Allometric intestinal development of broilers from breeders of different ages in the pre-starter phase.**

Helder F. Oliveira[1], Deibity A. Cordeiro[1], Natiele F. Oliveira[1], Carla Daniela S. Leite[1], Imar C. Fernandes[1], Jose H. Stringhini*[1, 2], Heloisa Helena d. Mello[1]
[1]Zootecnia, Universidade Federal de Goias, Goiania, Goias, Brazil, [2]CNPq research fellow, Goiania, Goias, Brazil

124 **Prevalence and risk factors associated with breast fillets myopathies (spaghetti meat, woody breast, and white striping) in broiler chickens from Ontario, Canada.**

Sunoh Che[GS*1], Shai Barbut[2], Chaoyue Wang[2], Christian Fuchs[4], Csaba Varga[3], Dorothee Bienzle[1], Leonardo Susta[1]
[1]Pathobiology, University of Guelph, Guelph, Ontario, Canada, [2]Food Science, University of Guelph, Guelph, Ontario, Canada, [3]Pathobiology, University of Illinois, Urbana, Illinois, United States, [4]Food Safety & Quality Assurance, Maple Leaf Foods, Mississauga, Ontario, Canada

125 **Intravenous T-61: an effective euthanasia method for poultry.**

Bethany Baker*[1], Antonietta L. Mortiz[2], Danielle Zwueste[2], Karen Schwean-Lardner[1], Karen L. Machin[3]
[1]Animal and Poultry Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [2]Small Animal Clinical Sciences, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [3]Veterinary Biomedical Sciences, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

Metabolism and Nutrition: Amino Acids
Chair: Joshua R. Steed, Micronutrients
Virtual Session Room VI

126 **Low crude protein diets: Does the modern broiler adapt to diet composition through manipulation of nutrient metabolism or are macro nutrient utilization values fiat data points?**
Craig W. Maynard[GS*1, 2], Amir E. Ghane[3], Peter V. Chrystal[2, 4], Peter H. Selle[2], Sonia Liu[2]
[1]Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States, [2]Poultry Research Foundation, The University of Sydney, Camden, New South Wales, Australia, [3]DuPont Limited, Wilmington, Delaware, United States, [4]Baiada Poultry Pty Limited, Pendle Hill, New South Wales, Australia

127 **Impacts of dietary crude protein and electrolyte balance on production performance, carcass traits, litter quality and serum parameters of broiler chickens.**
Els Willems[1], Eric Bruininx[1], Bart Swart[1], Marije van Tol[3], William Lambert*[2]
[1]Agrifirm, Apledoorn, Netherlands, [2]Ajinomoto Animal Nutrition Europe, Paris, France, [3]Orffa Additives B.V., Netherlands

128 **Late vs. early planting/harvesting increased the energy and amino acid digestibility of faba bean cultivars fed to broiler chickens.**
Robin Ketelaar[3], Miranda N. Smit[1], Liangfei He[2], Eduardo Beltranena*[1, 2]
[1]Research and Extension Division, Alberta Agriculture and Forestry, Edmonton, Alberta, Canada, [2]Department of Agricultural, Food & Nutritional Science, University of Alberta, Edmonton, Alberta, Canada, [3]Wageningen University, Wageningen, Netherlands

129 **Effect of lysine on transcriptome profile and expression of selected cationic amino acid transporters in broiler chickens.**
Collins Khwatenge[GS*], Samuel N. Nahashon
Department of Agricultural and Environmental Sciences, Tennessee State University, Nashville, Tennessee, United States

130 **Suppressive effects of glutamate and glutamine co-supplementation on muscle proteolysis in heat-stressed broiler chickens.**
Kyohei Furukawa*[1, 2], Motoi Kikusato[1], Wu Guoyao[3], Masaaki Toyomizu[1]
[1]Graduate School of Agricultural Science, Tohoku University, Sendai, Japan, [2]The University of Tokyo, Bunkyo-ku, Tokyo, Japan, [3]Department of Animal Science, Texas A&M University, College Station, Texas, United States

131 **Composition of different feather tracts of broilers.**
Bruno Balbino Leme[GS*1], Carolina Cardoso Nagib Nascimento[1], Matheus D. Reis[1], Larissa Vargas[1], Rony Riveros Lizana[1], Robert Mervyn Gous[2], Nilva Sakomura[1]
[1]Animal Science, UNESP, Jaboticabal, São Paulo, Brazil, [2]University of KwaZulu-Natal, KwaZulu- Natal, South Africa

132 **Wnt/β-catenin signaling pathway mediated methionine promotes feather follicle development in chick embryos.**
Meng-jie Chen[GS*], Xiu-qi Wang, Hui-chao Yan, Chun-qi Gao
College of Animal Science, South China Agricultural University/Guangdong Provincial Key Laboratory of Animal Nutrition Control, Guangzhou, Guangdong, China

133 **Influence of diet formulation technique on requirements and ideal profile of digestible Lys, Met+Cys and Thr for grower of Japanese quail.**
Tamires M. Silva Felix[UG*], Aliton N. Silva, Thalis Oliveira, José H. Vilar Da Silva
Animal Science, Universidade Federal da Paraíba, Solânea, Paraíba, Brazil

134 **Determination of the 4th limiting amino acid for Ross 308 male broilers from 15 to 35 day in low crude protein wheat-based diets.**
Craig W. Maynard[GS*1, 2], Michael T. Kidd[1], Peter V. Chrystal[2, 3], Peter H. Selle[2], Sonia Liu[2]
[1]Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States, [2]Poultry Research Foundation, The

University of Sydney, Camden, New South Wales, Australia, [3]Baiada Poultry Pty Limited, Pendle Hill, New South Wales, Australia

135 **Determination of standardized digestible amino acid requirements for broiler breeders.**
Jordan Weil[GS*1], Antonio Beitia[1], Nawin Suesuttajit[1], Katie Hilton[2], Pramir Maharjan[1], Diego Martinez[1], Justina V. Caldas[3], Shivi Rao[3], Craig N.Coon[1]
[1]Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States, [2]DuPont, Wilmington, Delaware, United States, [3]Cobb-Vantress Inc., Siloam Springs, Arkansas, United States

136 **Determining the lysine requirement in broiler breeders using the indicator amino acid oxidation and nitrogen balance methods.**
Jordan Weil[GS*1], Antonio Beitia[1], Nawin Suesuttajit[1], Katie Hilton[3], Pramir Maharjan[1], Diego Martinez[1], Justina V. Caldas[2], Shivi Rao[2], Craig N. Coon[1]
[1]Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States, [2]Cobb-Vantress Inc., Siloam Springs, Arkansas, United States, [3]DuPont, Wilmington, Delaware, United States

137 **Response of laying hens to the intake of digestible leucine.**
Mirella Melaré[GS]*, Matheus D. Reis, Felipe Fabbri, Guilherme Teofilo, Nilva Sakomura
UNESP, Jaboticabal, Sao Paulo, Brazil

138 **Meta-analysis of broiler response to dietary valine supply.**
Maroua Zouaoui*[1], William Lambert[2], Marie-Pierre Létourneau-Montminy[1]
[1]Sciences Animales, Université LAVAL, Quebec, Quebec, Canada, [2]Ajinomoto Animal Nutrition Europe, Paris, France

Metabolism and Nutrition: Enzymes

Chair: Michael E. Persia, Virginia Tech

Virtual Session Room VII

139 **Effect of feeding inositol or high phytase on laying hen performance and amino aciddigestibility.**
Eugenia Herwig*[1], Carrie Walk[2], Mike Bedford[2], Henry Classen[1], Karen Schwean-Lardner[1]
[1]Department of Animal and Poultry Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [2]AB Vista, Marlborough, United Kingdom

140 **Phytase on leg health parameters and bone development under commercial conditions for Ross 708 broilers.**
Maria C. Alfaro-Wisaquillo[GS*1], Andres Ortiz[1,2], Yilmar Matta[1,2], Sebastian Hoyos[1,2], Gherly D. Buitrago[1,2], Juan D. Martinez[1,2], Jonathan Yanquen[1,2], Anel Atencio[4], Rocio Crespo[3], Edgar O. Oviedo-Rondon[1]
[1]Prestage Department of Poultry Science, North Carolina State University, Raleigh, North Carolina, United States, [2]Facultad de Medicina Veterinaria y Zootecnia, Universidad del Tolima, Ibague, Tolima, Colombia, [3]College of Veterinary Medicine, North Carolina State University, Raleigh, North Carolina, United States, [4]Perdue Foods, LLC, Salisbury, Maryland, United States

141 **Comparison of an intrinsically heat stable and a coated phytase on growth performanceand tibia characteristics of broiler chicks.**
Brooke Bodle[GS*1], Cole Crumpacker[1], Trevor Lee[1], Mark Jackson[2], Sam Rochell[1]
[1]Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States, [2]Huvepharma, Peachtree City, Georgia, United States

142 **Ileal digestibility and *myo*-inositol plasma concentration of broiler chickens fed high phytase doses and different soybean meal protein content.**
Leopoldo M. Almeida[GS*1], Lucas S. Bassi[2], Rafael Sens[1], Vitor Augusto B. Zavelinski[1], Levy Teixeira[3], Alex Maiorka[2]
[1]Veterinary Science, Federal University of Paraná, Curitiba, Brazil, [2]Department of Animal Sciences, Federal University of Paraná, Curitiba, Paraná, Brazil, [3]DSM Nutritional Products, São Paulo, Brazil

143 **Phytase doses and soybean meal protein content on growth performance, bone mineral composition and toe ash of broilers.**
Vitor Augusto B. Zavelinski[GS*1], Lucas S. Bassi[2], Rafael Sens[1], Gabriela d. Pilon[1], Kariny F. da Silva[1], Levy Teixeira[3], Simone G. de Oliveira[1]
[1]Federal University of Paraná, Curitiba, Paraná, Brazil, [2]Department of Animal Sciences, Federal University of Paraná, Curitiba, Paraná, Brazil, [3]DSM Nutritional Products, São Paulo, São Paulo, Brazil

144 **Comparative efficacy and dose effects of a novel consensus bacterial 6-phytase variant and a commercial 6-phytase on retention of phosphorus and calcium in egg laying hens fed inorganic P-free diet.**
Abiodun Bello*[1], Mick Roberts[2], Yueming Derjant-Li[1], Leon Marchal[1]
[1]DuPont Nutrition & Biosciences, Oegstgeest, South Holland, Netherlands, [2]AH Pharma, Inc, Salisbury, Maryland, United States

145 **Effect of a novel consensus bacterial 6-phytase variant on ileal nutrient digestibility, tibia ash, and growth performance in broilers through 48 days of age.**
Eric B. Sobotik[GS*1], Gabrielle M. House[1], Austin M. Stiewert[1], Abiodun Bello[2], Yueming Derjant-Li[2], Janet Remus[2], Ellie Shoesmith[2], Gregory S. Archer[1]
[1]Poultry Science, Texas A&M University, College Station, Texas, United States, [2]Nutrition & Biosciences, DuPont, Oegstgeest, South Holland, Netherlands

146 **Comparative efficacy of a novel consensus bacterial 6-phytase variant and a commercial6- phytase at 2,000 FTU/kg on growth performance, tibia ash and economic benefit in broilers.**
Abiodun Bello*[1], Eric B. Sobotik[2], Gregory S. Archer[2], Yueming Derjant-Li[1], Leon Marchal[1]
[1]DuPont Nutrition & Biosciences, Oegstgeest, South Holland, Netherlands, [2]Poultry Science, Texas A&M University,

College Station, Texas, United States

147 **Effect of feed form and a novel consensus bacterial 6-phytase variant on performance,bone ash and phosphorus retention of broiler chickens fed diets without inorganic phosphate.**
Yueming Derjant-Li*[1], Abiodun Bello[1], Ellie Shoesmith[1], Enric Esteve[2]
[1]Animal Nutrition, DuPont Nutrition and Biosciences, Oegstgeest, Netherlands, [2]IRTA, Animal Nutrition, Centre Mas Bové, Constantí, Spain

148 **A novel consensus bacterial 6-phytase variant increased phosphorus and calcium retention and productivity parameters in egg laying hens fed inorganic P-free diet.**
Arun Kumar*[1], Abiodun Bello[2], Yueming Derjant-Li[3]
[1]School of Agriculture and Food Science, University of Queensland, Gatton, Queensland, Australia, [2]Nutrition & Biosciences, DuPont, Oegstgeest, South Holland, Netherlands, [3]Animal Nutrition, DuPont Nutrition and Biosciences, Oegstgeest, Netherlands

149 **Effect of a novel consensus bacterial 6-phytase variant on apparent ileal digestibility of amino acids in broilers at 15 days of age.**
Yueming Derjant-Li*[1], M. Reza Abdollahi[2], Katie Waller[1], Abiodun Bello[1], Leon Marchal[1], V. Ravindran[2]
[1]Animal Nutrition, DuPont Nutrition and Biosciences, Oegstgeest, Netherlands, [2]School of Agriculture and Environment, Massey University, Palmerston North, New Zealand

150 **Effects of phytase supplementation and nutrient uplifts on growth performance, meat yield, hypothalamic gene expression, and catecholamine concentrations in broilers from 1 to 43 days of age.**
Ruben Kriseldi[GS]*[1], Laci MacKay[4], Chad Foradori[4], Ryan Dilger[3], Mike Bedford[2], Carrie L. Walk[2], William A. Dozier, III[1]
[1]Poultry Science, Auburn University, Auburn, Alabama, United States, [2]AB Vista, Marlborough, United Kingdom, [3]Animal Science, University of Illinois, Urbana, Illinois, United States, [4]Anatomy, Physiology, and Pharmacology, Auburn University, Auburn, Alabama, United States

151 **Nutrient digestibility and *myo*-inositol plasma concentration on turkeys fed high levels of phytase.**
Lucas S. Bassi[GS]*[1], Levy Teixeira[2], Rafael Sens[3], Filipe A. Moreno[3], Letícia Dzierva[1], Marley C. Santos[1], Alex Maiorka[1]
[1]Department of Animal Sciences, Federal University of Paraná, Curitiba, Paraná, Brazil, [2]DSM Nutritional Products, São Paulo, Brazil, [3]Veterinary Science, Federal University of Paraná, Curitiba, Paraná, Brazil

152 **Effect of phytase type and inclusion level on broiler performance and tibia ash from 1 to 21 d of age.**
Martha Rueda Lastres[GS]*[1], Oscar Machado[1], Danny Patino[1], Ronald Pivaral[1], Wilmer J. Pacheco[1], Mark Jackson[2], Omar Gutierrez[2]
[1]Poultry Science, Auburn University, Auburn, Alabama, United States, [2]Huvepharma Inc., Peachtree City, Georgia, United States

153 **Total inorganic phosphorus free and more economical broiler diets supplemented witha novel consensus bacterial 6-phytase variant maintained normal growth characteristics in all phases.**
Leon Marchal*[1, 2], Yueming Derjant-Li[1], Abiodun Bello[3], Eric B. Sobotik[4], Gregory S. Archer[4]
[1]Dupont Animal Nutrition, Warnsveld, Netherlands, [2]Animal Nutrition, Wageningen University, Wageningen, Netherlands, [3]Nutrition & Biosciences, DuPont, Oegstgeest, South Holland, Netherlands, [4]Poultry Science, Texas A&M University, College Station, Texas, United States

154 ***In vitro* set up to compare Phosphate (PO^{-3}_4) availability in feed dietformulations.**
Diogo F. Rosso*[1], Jacqueline C. de Souza[1], Levy Teixeira[3], Rafael Sens[3], Lucas S. Bassi[2], Alex Maiorka[2]
[1]Novozymes Latin America, Araucária, Paraná, Brazil, [2]Department of Animal Sciences, Federal University of Paraná, Curitiba, Paraná, Brazil, [3]DSM Nutritional Products, Mairinque, São Paulo, Brazil

155 **Xylanase and protease supplementation to diets with varying levels of fiber and protein influenced the jejunal digesta hexose and pentose oligosaccharides profiles and nutrient utilization in broiler chickens.**

Yang Lin[GS]*, Oluyinka Olukosi
Poultry Science, University of Georgia, Athens, Georgia, United States

156 **The effect of multi-carbohydrase preparation on growth performance andnutrient utilization in broiler chickens fed diets with high inclusion of canola meal.**

Yanxing (Stella) Niu[GS*1], Anna Rogiewicz[1], Lan Shi[1], Rob Patterson[2], Bogdan A. Slominski[1]
[1]Department of Animal Science, University of Manitoba, Winnipeg, Manitoba, Canada, [2]Canadian Bio-Systems Inc., Calgary, Alberta, Canada

157 **Effects of an algae-clay complex with or without endogenous enzyme supplementation on the feed efficiency of broilers.**

Marie Gallissot*[1], Aleixo E. Pedro[2], Luiz Fernando T. Albino[2], Santiago H. Rostagno[2], Raquel Pereira[1], Maria Angeles Rodriguez[1]
[1]Olmix Group, Brehan, France, [2]Agricultural Science Center, University of Viçosa, Viçosa, Brazil

Metabolism and Nutrition: Feed Additives

Chair: John W. Boney, Pennsylvania State University

Virtual Session Room VIII

158 **Evaluation of two types of marine rest raw materials in broiler diets: Effects on liveperformance and meat lipid quality.**

Ahmad Fraz[GS*2], Ibrahim A. Khan[2], Bing Brackeen[1], Gita Cherian[2]

[1]Pacific Seafood, Pacific Bio Products, Warrenton, Oregon, United States, [2]Animal and Rangeland Sciences, Oregon State University, Corvallis, Oregon, United States

159 **An algae-derived feed ingredient positively impacted broiler growth performance inthe grower phase but did not alter intestinal integrity.**

Meaghan M. Meyer[GS*], Elizabeth A. Bobeck

Animal Science, Iowa State University, Ames, Iowa, United States

160 **Chitosan oligosaccharides as potential antibiotic replacements in broiler diets.**

Emanuele C. Goes[GS*], Yao Huang, Lingyun Chen, Doug Korver

Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Alberta, Canada

161 **Evaluating the effects of a novel phytogenic feed additive on performance of broilers fed a lowor standard protein diet.**

Chasity M. Pender*[1], Shelby Ramirez[1], G. R. Murugesan[1], Eric B. Sobotik[2], Gregory S. Archer[2]

[1]Biomin America Inc., Overland Park, Kansas, United States, [2]Department of Poultry Science, Texas A&M University, College Station, Texas, United States

162 **Sweet potato (*Ipomoea batata*) as natural additive: effect on productive performanceof Creole chickens of Mexico in initiation phase.**

Cesar A. Pérez-Torres[GS*3], Diana A. Gutiérrez Arenas[3], Arturo Pro-Martínez[2], Eliseo Sosa-Montes[1], Leonardo Osio-Orihuela[1], Vanesa R. Lavastida[1], Luis Morales-Higuera[1], Fernando González-Cerón[1]

[1]Animal Science Department, Chapingo Autonomous University, Texcoco, State of Mexico, Mexico, [2]College of Postgraduates, Texcoco, State of Mexico, Mexico, [3]Life of Sciences Division, University of Guanajuato, Irapuato, Guanajuato, Mexico

163 **Effect of sweet potato (*Ipomoea batata*) on carcass yield of Creole chickens of Mexico.**

Vanesa R. Lavastida[UG*1], Luis Morales-Higuera[1], Diana A. Gutiérrez Arenas[2], Arturo Pro-Martínez[3], Leonardo Osio-Orihuela[1], Eliseo Sosa-Montes[1], Fernando González-Cerón[1], Cesar A. Pérez-Torres[2]

[1]Animal science, Chapingo Autonomous University, Texcoco, México, Mexico, [2]Life of Sciences Division, University of Guanajuato, Irapuato , Guanajuato, Mexico, [3]College of postgraduates, Texcoco, México, Mexico

164 **Effects of black soldier fly larvae oil on growth performance, gut physiology and fattyacid composition of broiler chickens.**

Yoo Bhin Kim[GS*1], Da-Hye Kim[1], Sang Hyeok Lee[1], Tae-hoon kim[2], Hong gu ee[1], Kyung-Woo Lee[1]

[1]Konkuk university, Seoul, Korea (the Republic of), [2]Foody Worm, Cheongju-si, Korea (the Republic of)

165 **Evaluation of two different phytase sources when supplemented to broiler starter diets on growth performance, tibia bone ash, and tibia breaking strength.**

Kimberly N. Gardner[GS*1], Mark Jackson[2], Omar Gutierrez[2], Christopher A. Bailey[1]

[1]Poultry Science, Texas A&M University, College Station, Texas, United States, [2]Huvepharma, Peachtree, Georgia, United States

166 **Yield of cuts and abdominal fat in broilers fed diets containing levels of pequi oil.**

Pedro P. Trevisani, Jéssica M. Cruvinel[UG*], Priscila M. Groff-Urayama, Fernanda Kaiser de Lima- Krenchinski, Cássio Y. Oura, Tatiane Souza dos Santos, Erica S. Mello, Julianna Batistioli, Carolina Santos, Evelyn P. Brito, Iasmin M. Farias, Andrey Savio, José R. Sartori, Antônio Celso Pezzato

Animal Nutrition Department, School of Veterinary Medicine and Animal Science, Botucatu, Brazil

167 **Effect of Crina Digest on growth performance and blood carotene concentrations of42-day-old broilers.**
Jorge L. Sandoval[UG*1], Gerardo A. Abascal-Ponciano[1], Shelby P. Corray[2], Jessica D. Starkey[1], Charles W. Starkey[1]
[1]Poultry Science, Auburn University, Auburn, Alabama, United States, [2]DSM Nutritional Products, Parsippany, New Jersey, United States

168 **Effect of the probiotic *Escherichia coli* strain nissle on Growth Performance of Broiler Chickens.**
Angela Washington[GS*], Carla Larrieu, Jada Black, Thyneice Taylor-Bowden, Samuel N. Nahashon
Department of Agricultural and Environmental Sciences, Tennessee State University, Nashville, Tennessee, United States

169 **The effect of Viligen® on performance and intestinal morphology of the broiler birds exposed to heat stress during d21- d42 of the finishing period.**
Manoj B. Kudupoje*[1, 2], Daniel Graugnard[2], Alexandros Yiannikouris[2], Malathi V[1]
[1]Poultry Science, KVAFSU, Bangalore, Karnataka, India, [2]Center for animal Nutrigenomics & Applied Animal Nutrition, Alltech Inc., Nicholasville, Kentucky, United States

170 **Dietary supplementation of alpha-lipoic acid mitigates the negative effects of heat stressin poultry.**
Sanjeev Wasti[GS*], Nirvay Sah, Chin N. Lee, Rajesh Jha, Birendra Mishra
Department of Human Nutrition Food and Animal Sciences, University of Hawaii at Manoa, Honolulu, Hawaii, United States

171 **Effect of two limestone sources (fine, coarse) and a novel consensus bacterial6-phytase variant on ileal P and Ca absorption and tibia ash content of youngbroilers.**
Cees Kwakernaak[1], Yueming Derjant-Li*[2], Abiodun Bello[2]
[1]Poultry Nutrition, Schothorst Feed Research, Lelystad, Netherlands, [2]Nutrition & Biosciences, DuPont, Oegstgeest, South Holland, Netherlands

172 **Use of quantile regression model to evaluate the effects of hydroalcoholic extract of leaves and stems of *Capparis spinosa* on final weight of Ross broilers.**
Pouyan Malekinezhad[GS*1, 2], Laura Ellestad[1], Moslem Bashtani[2], Seyed Homayoun Farhangfar[2], Hadi Sarir[2]
[1]Poultry Science, University of Georgia, Athens, Georgia, United States, [2]Animal Sciences, University of Birjand, Birjand, Iran (the Islamic Republic of)

173 **Improved performance of turkey toms administered two phytogenic feed additive blends throughout grow-out.**
Emily Kimminau*[1], Theodore Karnezos[1], Nicholas Evans[2], Curtis Novak[2]
[1]Land O' Lakes, Williamsburg, Virginia, United States, [2]Purina, St. Louis, Missouri, United States

174 **The effect of a synbiotic applied as a coarse spray at the hatchery versus early drinkingwater application on broiler chick performance and intestinal morphology.**
Elli Dearmont[GS*1], Sheila Purdum[1], Kathryn Hanford[2]
[1]Animal Science, University of Nebraska, Lincoln, Nebraska, United States, [2]University of Nebraska, Lincoln, Nebraska, United States

175 **Evaluation of a novel proprietary feed additive to strengthen or substitute avilamycin growth promoter in broiler standard program.**
Bertrand MEDINA[1], Dana KUMPRECHTOVA[3], Ashley Wagner*[1], Vlastislav Machander, Ivan D. Girard[1]
[1]Probiotech International Inc., St-Hyacinthe, Quebec, Canada, [2]International Poultry Testing (MTD), Ustrasice, Czechia, [3]Institute of Animal Science, Prague, Czechia

176 **The effects of yeast fermentate prebiotic feed additive on the lactic acid producing bacteria in an *in vitro* microaerophilic cecal culture model.**
Lindsey A. Wythe[UG*], Kristina M. Feye, Dana K. Dittoe, Steven Ricke
Food Science, University of Arkansas, Fayetteville, Arkansas, United States

177 **The impact of dietary Beta-Glucans on poultry health and performance.**
Luke Trimble[UG*2], Arianna Ferguson[2], Brooke Migdal[2], Max Pasquinelli[2], Nuket Acar[2], Paul Patterson[1]
[1]Animal Science, Penn State University, University Park, Pennsylvania, United States, [2]Veterinary & Biomedical Sciences, Penn State University, University Park, Pennsylvania, United States

178 **Effects of *Bacillus subtilis* on intestinal morphological structure of male broilers with or without coccidial challenge.**
Sabin Poudel[GS*], Wei Zhai
Department of Poultry Science, Mississippi State University, Starkville, Mississippi, United States

179 **Comparison between phytochemical pentadecylphenol and cocci vaccines ongrowth performance and serum parameters in broilers.**
Hanyi Shi[GS*1, 2], Yiran Luo[2], Qingqing Deng[2], Woo Kim[1], Ning Liu[2]
[1]Poultry Science Department, University of Georgia, Athens, Georgia, United States, [2]Department of Animal Science, Henan University of Science and Technology, Luoyang, Henan, China

180 **Evaluation of anticoccidial activity of a phytogenic feed additive on growing broiler chickens.**
Hector Leyva-Jimenez*[1], Myrna Olvera-García[1], Carlos E. Bonilla[2], Pilar Castiblanco[2], Gonzalo Villar[1], Alberto Casarín-Valverde[1]
[1]Research and Development, Grupo Nutec, Querétaro, Querétaro, Mexico, [2]Poultry Technical Service, Grupo Nutec, Querétaro, Querétaro, Mexico

181 **Fatty acid properties and breast myopathy occurrences in chickens fed Quantum Blueat increasing dietary inclusions.**
Reagan N. Cauble[GS*1], Elizabeth Greene[1], Barbara Mallmann[1], Sara Orlowski[1], Jason Apple[1], Carrie Walk[2], Mike Bedford[2], Sami Dridi[1]
[1]Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States, [2]AB Vista, Marlborough, United Kingdom

182 **Comparison of dried egg product vs chemical anticoccidial drugs administered to chickens during an enteritis infection caused by *Eimeria spp*. and *Clostridium perfringens*.**
Nannette Olmeda-Geniec*[1], Greg F. Mathis[2], Brett Lumpkins[2], Jeffery Escobar[1], Jordan M. Sand[3]
[1]Nutritional Health, Elanco Animal Health, Aston, Pennsylvania, United States, [2]Southern Poultry Research, Inc., Athens, Georgia, United States, [3]AbE Discovery, Madison, Wisconsin, United States

183 **Effects of Varium, an alternative to antibiotic growth promoters, on commercial broiler performance.**
San Ching*, Fang Chi
Amlan International, Chicago, Illinois, United States

184 **Assessing the effect of feeding *Bacillus subtilis* and mannan oligosaccharide on immune responses and enteric *Lactobacilli* and *Bifidobacteria* loads in broiler birds.**
Ragini Reddyvari[GS*]
Poultry Science , University of Georgia, Athens, Georgia, United States

185 **Beneficial effects of *bacillus subtilis 29784* on performance and gut health status of broilers under necrotic enteritis conditions.**
C. Keerqin[2], Lamya Rhayat*[1], Pascal Thiery[1], ZH Zhang[3], K Gharib-Naseri[2], SK KHERAVII[2], Estelle Devillard[1], TM Crowley[3], SB Wu[2]
[1]Adisseo, Commentry, France, [2]University of New England, Armidale, New South Wales, Australia, [3]Deakin University, Geelong, Victoria, Australia

186 **Using yucca and/or phytogenics on alleviating negative effects of necrotic enteritis in broilers.**
Lan Zheng*[1], Johel Bielke[2], Shelby Ramirez[1], Chasity M. Pender[1], Antonia Tacconi[3], G. R. Murugesan[1], Lisa Bielke[2]
[1]BIOMIN North America, Overland Park, Kansas, United States, [2]The Ohio State University, Wooster, Ohio, United States, [3]BIOMIN Holding GmbH, Getzersdorf, Austria

187 **Effects of Berberine on humoral immune response, hematological parameters,and lymphoid organ weights during aflatoxicosis and ochratoxicosis in broilers.**

Pouyan Malekinezhad[GS*1, 2], Laura Ellestad[1], Nazar Afzali[2], Seyed Homayoun Farhangfar[2], Arash Omidi[3], Abbas Mohammadi[4]

[1]Poultry Science, University of Georgia, Athens, Georgia, United States, [2]Animal Sciences, University of Birjand, Birjand, Iran (the Islamic Republic of), [3]Animal Health Management, University of Shiraz, Shiraz, Iran (the Islamic Republic of), [4]Plant Pathology, University of Birjand, Birjand, Iran (the Islamic Republic of)

188 **Effect of n-3 FA and Vit D3 in keel bone properties and ca/p transporter profile in aviary Lohmann browns.**

Dima L. White[GS*1], Darrin M. Karcher[2], Prafulla Regmi[3], Woo Kim[1]

[1]Poultry Science, University of Georgia, Athens, Georgia, United States, [2]Animal Science Department, Purdue University, West Lafayette, Indiana, United States, [3]Prestage Department of Poultry Science, North Carolina State University, Raleigh, North Carolina, United States

189 **Effect of dietary phosvitin on shell and bone quality in end-of-cycle laying hens.**

Daniella Batres[GS*], Jiangping Wu, Douglas R. Korver

Agricultural, Life and Environmental Sciences, University of Alberta, Edmonton, Alberta, Canada

190 **Production of omega-3 enriched eggs with dietary water-soluble flaxseed oil.**

Sang Hyeok Lee[GS*1], Yoo Bhin Kim[2], Da-Hye Kim[4], Dong won Lee[3], Hong-Gu Lee[1], Kyung-Woo Lee[1]

[1]Konkuk university, Seoul, Korea (the Republic of), [2]Konkuk University, Seoul, Korea (the Republic of), [3]Haitnim Bio, Icheon-si, Korea (the Republic of), [4]Konkuk university, Seoul, Korea (the Republic of)

191 **Dietary substitution of processed yam peel meal for maize with multienzymes+yeast supplementation in Japanese quails (*Coturnix coturnix japonica*): Effect on laying performance and egg quality.**

Paschal C. Aguihe[GS*1], Abiodun S. Kehinde[2], Sulyman Abdulwahab[1], Deji A. Joshua[3], Priscillia L. Komolafe[4]

[1]Animal Production and Health Technology, Federal College of Wildlife Management, New Bussa, Nigeria, New bussa, Niger, Nigeria, [2]Wildlife Management, Forestry Research Institute of Nigeria, Ibadan, Nigeria, [3]Basic Science, Federal College of Wildlife Management, New Bussa, Nigeria, [4]Animal Science, University of Ibadan, New Bussa, Nigeria

192 **The effects of *Plantago psyllium* seeds on performance of laying Japanese quail.**

Asghar Sedaghat*, Mohammad Amir Karimi Turshizi

Poultry Science, Tarbiat Modares University, Ahram, Bushehr, Iran (the Islamic Republic of)

193 **Methionine activates JAK2/STAT5 by regulating prolactin to promote crop milk protein synthesis during lactation of domestic pigeons (*Columba livia*).**

Meng-jie Chen[GS*], Xiu-qi Wang, Hui-chao Yan, Chun-qi Gao

College of Animal Science, South China Agricultural University/Guangdong Provincial Key Laboratory of Animal Nutrition Control, Guangzhou, China

Metabolism and Nutrition: General Nutrition

Chair: Charles W. Starkey, Auburn University

Virtual Session Room IX

194 **Effect of split feeding system at late phase of laying period on egg production and egg quality of laying hens.**

Mohamed N. Makled*[1], M Elkelawy[2], A. E. Galal[1], M. M. Abdel Razik[1]

[1]Poultry Production Dept., Faculty of Agriculture, Assiut University, Assiut, Egypt, [2]Poultry Production Dept., Fac. of Agriculture, New Valley University, New Valley, Egypt

195 **Crude protein feed content on productive performance and characteristics of eggs from second-cycle laying hens in Mexico.**

Fernando Sánchez-Morales[UG*1], Jorge L. Cruz-Zúñiga[2], Diego Zárate-Contreras[3], Arturo Pro-Martínez[3], Marco A. Rivas-Jacobo[1], Fernando González-Cerón[2]

[1]Autonomous University of San Luis Potosí, San Luis Potosí, San Luis Potosí, Mexico, [2]Department of Animal Science, Chapingo Autonomous University, Texcoco, State of Mexico, Mexico, [3]Livestock Program, College of Postgraduates Campus Montecillo, Texcoco, State of Mexico, Mexico

196 **Visceral mass and allometry of metabolic size in laying pullet.**

Rony Riveros Lizana[GS*1], Freddy Horna Morillo[1], Carolina Cardoso Nagib Nascimento[1], Matheus D. Reis[2], Bruno Balbino Leme[2], Nilva Sakomura[1]

[1]Animal Science, Sao Paulo State University, Jaboticabal, Sao Paulo, Brazil, [2]Animal Science, UNESP, Jaboticabal, São Paulo, Brazil

197 **Effects of dietary supplementation with fermented feedstuffs on the performance, egg quality and intestinal health of laying hens.**

Shi-guang Jiang[GS*], Chen Zhong, Xiu-qi Wang, Chun-qi Gao

Department of Animal Science, South China Agricultural University, Guangzhou, China

198 **The effect of partial replacement of limestone with gypsum in layer diets on hen productivity, egg quality, ammonia emissions and ammonia emission intensity of egg production.**

Matt Oryschak*[1], Eduardo Beltranena[2, 3]

[1]Alberta Agriculture and Forestry, Edmonton, Alberta, Canada, [2]Alberta Agriculture and Forestry, Edmonton, Alberta, Canada, [3]Department of Agricultural, Food and Nutritional Sciences, University of Alberta, Edmonton, Alberta, Canada

199 **The effect of increasing digestible crude protein content in wheat-based hen diets on hen productivity, egg quality and ammonia emission intensity of egg production.**

Matt Oryschak*[1], Eduardo Beltranena[1, 2]

[1]Alberta Agriculture and Forestry, Edmonton, Alberta, Canada, [2]Department of Agricultural, Food and Nutritional Sciences, University of Alberta, Edmonton, Alberta, Canada

200 **Inoculation *in ovo* of putrescine on egg characteristics and hatchability rate of eggs from broiler breeders.**

Isabella C. Dias[GS*], Katiucia C. Sonalio, Filipe A. Moreno, Rosiane Araujo, Marley C. Santos, Chayane Rocha, Alex Maiorka

Federal University of Paraná, Curitiba, Paraná, Brazil

201 **Effects of broiler breeder maternal age on gene and protein expression in the liver and abdominal fat of the hen and the liver and yolk sac membrane of the embryo.**

Antonio Beitia[GS*1], Nirun Boonsinchai[2], Justina V.Caldas[3], Katie Hilton[1], Pramir Maharjan[1], Jordan Weil[1], Nawin Suesuttajit[1], Diego Martinez[1], Cole Umberson[1], Craig N. Coon[1]

[1]Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States, [2]CP Group, Bangkok, Thailand, [3]Cobb –Vantress, Siloam Springs, Arkansas, United States

202 **Feeding different cultivars and quality levels of faba bean to broiler chickens.**
Miranda N. Smit*[1], Liangfei He[2], Eduardo Beltranena[1, 2]
[1]*Livestock and Crops Research Division, Alberta Agriculture and Forestry, Edmonton, Alberta, Canada,* [2]*Agricultural, Food & Nutritional Sciences, University of Alberta, Edmonton, Alberta, Canada*

203 **Dietary supplemental full-fatted and defatted microalgae *Desmodesmus* sp. exerted similar impacts on growth performance and gut health of broiler chicks.**
Tao Sun[GS]*[1], Benjamin Wyman[1], Guanchen Liu[1], Colin Beal[2], Schonna Manning[4], Zackary I. Johnson[3], Xin Gen Lei[1]
[1]*Animal Science, Cornell University, Ithaca, New York, United States,* [2]*B&D Engineering and Consulting LLC, Lander, Wyoming, United States,* [3]*Nicholas School of the Environment, Duke University Marine Laboratory, Beaufort, North Carolina, United States,* [4]*Department of Molecular Biosciences, University of Texas at Austin, Austin, Texas, United States*

204 **Effect of the inclusion of enzyme-treated soy protein in starter diets of two different amino acid density feeding programs on performance of broiler chickens.**
Simone H. Rasmussen[1], Alfred Blanch*[1], Adam J. Davis[2], Christine Brøkner[1]
[1]*Hamlet Protein A/S, Horsens, Denmark,* [2]*Poultry Science Department, University of Georgia, Athens, Georgia, United States*

205 **Effects of cellulose and soybean hulls as sources of dietary fiber on the growth performance, nutrient digestibility, gut morphology, and intestinal gene expression of broiler chickens.**
Oscar J. Tejeda[GS]*, Woo Kim
Poultry Science, The University of Georgia, Athens, Georgia, United States

206 **Fermentation of soybean meal results in a net reduction of heat-labile and heat-stable antinutritional factors.**
Nelson Ruiz*[1], Andrea Robles - Montes[2], Jan E. van Eys[3]
[1]*Nelson Ruiz Nutrition, LLC, Suwanee, Georgia, United States,* [2]*Industrial de Oleaginosas Americanas S.A., San José, Costa Rica,* [3]*Global Animal Nutrition Solutions, Inc, Fourqueux, France*

207 **Effect of early posthatch supplementation of vitamin E and omega-3 fatty acids on the severity of wooden breast, breast muscle morphological structure, and gene expression in the broiler breast muscle.**
Ji Wang[GS]*, Daniel Clark, Sheila Jacobi, Sandra Velleman
The Ohio State University, Wooster, Ohio, United States

208 **The effects of maternal fish oil supplementation on offspring-broiler growth performance, body composition and bone microstructure at market age.**
Yuguo H. Tompkins[GS]*[1], Chongxiao Chen[1], Jeanna Wilson[1], Brynn H. Voy[2], Woo Kim[1]
[1]*Poultry Science, University of Georgia, Athens, Georgia, United States,* [2]*Department of Animal Science, University of Tennessee, Knoxville, Tennessee, United States*

209 **Growth performance and carcass characteristics of MV × Cobb 700 broilers fed diets varying in apparent metabolizable energy from 34 to 46 days of age.**
Stephanie Philpot[GS]*[1], Justina V. Caldas[2], William A. Dozier, III[1]
[1]*Poultry Science, Auburn University, Auburn, Alabama, United States,* [2]*Cobb Vantress, Siloam Springs, Arkansas, United States*

210 **Effect of putrescin inoculation *in ovo* on intestinal morphology at hatching and growth performance of broiler chickens in the initial phase.**
Katiucia C. Sonalio[GS]*, Lucas S. Bassi, Gabriela d. Pilon, Leopoldo M. Almeida, Isabella C. Dias, Chayane Rocha, Alex Maiorka
Federal University of Paraná, Curitiba, Paraná, Brazil

211 **Maternal fish oil alters adipose development in the broiler chick embryo.**
Minjeong Kim[GS*1], Usuk Jung[1], Kamille Piacquadio[1], Suchita Das[1], Liesel Schneider[1], Jeanna Wilson[2], Brynn H. Voy[1]
[1]Department of Animal Science, The University of Tennessee, Knoxville, Tennessee, United States, [2]Department of Poultry Science, University of Georgia, Athens, Georgia, United States

212 **Evaluation of Tasco (*Ascophyllum nodosum*) on the growth performance of mixed-sex broiler chickens.**
Robin Hilchie[GS*1], Bruce Rathgeber[1], Stephanie Collins[1], Joshua Gong[2], Janice MacIsaac[1]
[1]Animal Science and Aquaculture, Dalhousie University, Truro, Nova Scotia, Canada, [2]Agriculture and Agri-Food Canada, Guelph, Ontario, Canada

213 **Determination of daily dietary energy utilization for maximal protein deposition in fast-growing male broilers from 3 to18 days of age.**
Nawin Suesuttajit[GS*], Antonio Beitia, Jordan Weil, Pramir Maharjan, Diego Martinez, Craig N. Coon
Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States

214 **Effects of supplementation of almond hulls on growth performance, lesion score and anti- oxidative enzyme activity in *Eimeria*-challenged broilers.**
Jinquan Wang[GS*1], Fanbin Kong[2], Woo Kim[1]
[1]Poultry Science Department, University of Georgia, Athens, Georgia, United States, [2]Food Science and Technology, University of Georgia, Athens, Georgia, United States

215 **Application of NutriOpt® formulation strategies for economic performance enhancement in broiler chickens.**
Hugo Romero-Sanchez*[1, 2], Yanming Han[2], Greg Page[2]
[1]Trouw Nutrition USA, Wake Forest, North Carolina, United States, [2]Trouw Nutrition, Amersfoort, Netherlands

216 **Ring test and validation of NutriOpt® NIR calibrations for ingredients and poultry feed in the USA.**
Hugo Romero-Sanchez*[1, 2], Lennart Oosterbaan[2]
[1]Trouw Nutrition USA, Wake Forest, North Carolina, United States, [2]Trouw Nutrition, Amersfoort, Netherlands

217 **Yellow mealworm larvae (*Tenebrio molitor*) grown on deoxynivalenol contaminated wheat as a feed ingredient for poultry.**
Dilshaan Duhra[GS*], Rex Newkirk, Karen Schwean-Lardner, Fiona Buchanan
Animal and Poultry Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

218 **Growth response of dual purpose grower chickens fed diets containing graded levelsof Black Soldier fly larvae meal.**
Oluremi A. Osinowo[GS*1, 2], Adeboye Fafiolu[2, 3], Oluseyi O. Oluwatosin[2, 3], Oluwagbemiga O. Adeleye[4], Adedotun A. Adegbenjo[3], Joel O. Alabi[2, 3]
[1]Agricultural Education Department, Federal College of Education, Abeokuta, Ogun State, Abeokuta, Ogun, Nigeria, [2]Centre of Excellence in Agricultural Development and Sustainable Environment, Federal University of Agriculture, Abeokuta, Abeokuta, Ogun, Nigeria, [2, 3]Animal Nutrition Department, Federal University of Agriculture, Abeokuta, Abeokuta, Ogun State, Nigeria, [4]Animal Production and Health, Federal University of Agriculture, Abeokuta, Abeokuta, Ogun State, Nigeria

219 **Effect of the electrolyte balance on the diet of Japanese quail in thermoneutrality or heat stresson productive performance.**
Antônio Celso Pezzato, José Sartori, Daniele Santos de Souza, Juliana Denadai, Armando Contin Neto, Everton Moreno Muro, Guilherme Pasquali, Leonardo Henrique Zanetti, Raimundo Gonçalves Ferreira Netto, Tatiane Souza dos Santos, Julianna Batistioli, Fernanda Kaiser de Lima-Krenchinski, Jéssica M. Cruvinel, Priscila M. Groff-Urayama*, Cássio Y. Oura
São Paulo State University (UNESP), School of Veterinary Medicine and Animal Science, Botucatu, Brazil

220 **Effect of dietary supplementation with Corn Distillers Dried Grains with Solubles on production and egg characteristics of laying Japanese Quails.**

Juliana F. Martinez[GS*1], Isabelli D. Pereira[1], Caio S. Quirino[2], Tatiana M. Bittencourt[1], Elieverson F. Amaral[2], Nayara E. Silva[1], Alessandro B. Amorim[3], Heder José D. Lima[1]

[1]Federal University of Mato Grosso, Rondonópolis, Mato Grosso, Brazil, [2]Federal University of the Valley of Jequitinhonha and Mucuripi, Diamantina, Minas Gerais, Brazil, [3]Institute of Agricultural and Technological Sciences, Federal University of Rondonópolis, Rondonopolis, Mato Grosso, Brazil

221 **Different Dietary Electrolyte Balance values on femur quality of Japanese Quail (*Coturnix coturnix japonica*) under a thermoneutral environment or heat stress.**

Antônio Celso Pezzato, José R. Sartori, Daniela S. Souza, Juliana Denadai, Tatiane Souza dos Santos, Fernanda Kaiser de Lima-Krenchinski, Julianna Batistioli, Raimundo Gonçalves Ferreira Netto, Guilherme Pasquali, Leonardo Henrique Zanetti, Everton Moreno Muro, Armando Contin Neto, Priscila M. Groff-Urayama, Jéssica M. Cruvinel[UG*]

Animal Breeding and Nutrition, São Paulo State University (UNESP), Botucatu, Brazil

222 **Trends in Mycotoxin Contamination in the United States Corn Crop.**

Chasity M. Pender*[1], Erika G. Hendel[1], Paige N. Gott[1], Shelby Ramirez[1], Ursula Hofstetter -Schähs[2], G. R. Murugesan[1]

[1]Biomin America Inc., Overland Park, Kansas, United States, [2]Biomin Holding GmbH, Getzersdorf, Austria

223 **Assay of AMEn of soybean meal and canola meal using corn-soybean meal and corn-canolameal reference diets employing the difference and regression methods.**

Shravani Veluri[GS*]

Department of Poultry Science, University of Georgia, Athens, Georgia, United States

224 **The effect of added water, holding time or phytase analysis method on phytase stability and pellet quality.**

Marut Saensukjaroenphon[1], Caitlin E. Evans[GS*1], Chad B. Paulk[1], Joel McAtee[2], Charles R. Stark[1]

[1]Grain Science and Industry, Kansas State, Manhattan, Kansas, United States, [2]AB Vista Inc., Plantation, Florida, United States

225 **Correlation between data on proximal composition and protein quality variables of commercial samples of heat processed soybeans analyzed by wet chemistry or estimated by NIRS technology.**

L. Cámara, L. Aguirre, A.F. de Juan, G. Fondevila, J. Ben Mabrouk, Gonzalo Mateos*

UPM, Madrid, Madrid, Spain

226 **Intrinsic factors contribute to variation in the AME_N value of corn for broiler chickens.**

Sibongiseni S. Nkabinde[GS*1,2], Christine Jansen van Rensburg[2], Wiana Louw[3], Kyle M. Venter[1,2], Peter W. Plumstead[1]

[1]Chemunique PTY LTD, Lanseria, South Africa, [2]Animal and Wildlife Science , University Of Pretoria, Newcastle, Kwa-Zulu Natal, South Africa, [3]South African Grains Laboratory, Pretoria, South Africa

227 **Corn drying temperature, particle size, and amylase supplementation on live performance and nutrient utilization of Cobb 500 chickens.**

Gustavo Quintana-Ospina[GS*1], Hernan A. Cordova-Noboa[1] Andres Ortiz[1,2], Yilmar Matta[1,2], Sebastian Hoyos[1,2], Gherly D. Buitrago[1,2], Juan D. Martinez[1,2], Jonathan Yanquen[1,2], Lorena Castellanos[1,2], Jose O. Sorbara[3], Edgar O. Oviedo-Rondon[1]

[1]Prestage Department of Poultry Science, North Carolina State University, Raleigh, North Carolina, United States, [2]Facultad de Medicina Veterinaria y Zootecnia, Universidad del Tolima, Ibague, Tolima, Colombia, [3]DSM Nutritional Products, Kaiseraugst, Switzerland

228 **Comparison of corn particle size utilizing different sieving methods.**

Allan J. Calderon[GS*], Gerardo A. Abascal-Ponciano, Jorge L. Sandoval, Wilmer J. Pacheco, Charles W. Starkey

Poultry Science, Auburn University, Auburn, Alabama, United States

229 **Assessment of the angle of repose as a method to measure the flowability of different particle sizes of ground corn using different sample amounts and box dimensions.**
Henry J. Flowers[UG]*, Moses E. Chilenje, Marc R. Presume, Jorge L. Sandoval, Gerardo A. Abascal- Ponciano, Wilmer J. Pacheco, Charles W. Starkey
Poultry Science, Auburn University, Auburn, Alabama, United States

230 **Comparison of the accuracy of different particle size field evaluation methods.**
Gerardo A. Abascal-Ponciano[GS]*, Wilmer J. Pacheco, Charles W. Starkey
Poultry Science, Auburn University, Auburn, Alabama, United States

231 **The impact of fines inclusion level and conditioning temperature on pellet quality and energy consumption.**
Caitlin E. Evans[GS]*, Marut Saensukjaroenphon, Chad B. Paulk, Charles R. Stark
Grain Science and Industry, Kansas State, Manhattan, Kansas, United States

232 **Improved pellet quality reduces on-farm nutrient segregation.**
Courtney Poholsky[GS]*, Dan Hofstetter, John W. Boney
Penn State University, Howard, Pennsylvania, United States

233 **Improper handling, preparation, and calibration of samples for NIRS analysis increases variability and decreases accuracy of nutrient concentration results.**
Samuel F. Leiva[GS]*, Gerardo A. Abascal-Ponciano, Wilmer J. Pacheco, Charles W. Starkey
Poultry Science, Auburn University, Auburn, Alabama, United States

Metabolism and Nutrition: Vitamins and Minerals

Chair: Duarte Neves, Zinpro Corporation

Virtual Session Room X

234 **Effect of combined maternal and post-hatch dietary 25-hydroxycholecalciferol supplementation on broiler chicken *Pectoralis major* muscle growth characteristics and Wooden Breast.**
Luis P. Avila[GS*1], Samuel F. Leiva[1], Gerardo A. Abascal-Ponciano[1], Joshua J. Flees[1], Kelly M. Sweeney[2], Jeanna Wilson[2], Anthony Pokoo-Aikins[3], Shelby P. Corray[3], Gilberto Litta[4], Charles W. Starkey[1], Jessica D. Starkey[1]
[1]Poultry Science, Auburn University, Auburn, Alabama, United States, [2]Poultry Science, University of Georgia, Athens, Georgia, United States, [3]DSM Nutritional Products, Parsippany, New Jersey, United States, [4]DSM Nutritional Products, Basel, Switzerland

235 **Effects of the *in ovo* injection of vitamin D_3 and 25-hydroxyvitamin D_3 on the vitamin D_3 activity-related gene expression of broilers challenged with coccidiosis.**
Saman Fatemi*, Katie E. Elliott, Abdul Mohssen Alqhtani, Ayoub Mousstaaid, Li Zhang, E. David Peebles
Poultry Science, Mississippi State University, Starkville, Mississippi, United States

236 **Effects of the *in ovo* injection of vitamin D_3 and 25-hydroxyvitamin D_3 on the immune-related gene expression of broilers challenged with coccidiosis.**
Saman Fatemi*, Katie E. Elliott, Abdul Mohssen Alqhtani, Ayoub Mousstaaid, Li Zhang, E. David Peebles
Poultry Science, Mississippi State University, Starkville, Mississippi, United States

237 **The Effect of Dietary Cadmium on Production Performance of Laying Hens and Its Accumulation in Tissues.**
Cai m. Wu*, JUAN Zhang, GUANGMANG LIU
Institute of Animal Nutrition, Sichuan Agricultural University, Chengdu, China

238 **Effect of limestone particle size and potassium supplementation on live performance and blood physiology of male broiler chickens.**
Dinabandhu Joardar*, Kimberly Livingston, Frank Edens, Rasha Qudsieh, Matthew Livingston, John Brake
Prestage Department of Poultry Science, North Carolina State University, Raleigh, North Carolina, United States

239 **A coordinated dysregulation of candidate genes signs a deteriorated Ca/P balance in ageing laying hens.**
Audrey Gloux[1], Nathalie Le Roy[1], Nathalie Même[1], Marie-Liesse Piketty[3], Dominique Prie[3], Gaelle Benzoni[2], Joel Gautron[1], Yves Nys[1], Agnes Narcy[1], Michel J. Duclos*[1]
[1]BOA INRAE Université de Tours, Nouzilly, France, [2]ADM Animal Nutrition, Saint Nolff, France, [3]Institut Necker-Enfants Malades, INSERM U1151-CNRS UMR8253, Paris, France

240 **Effects of dietary Ca and microbial phytase on zinc utilization.**
Denise Cardoso*[1], Manon Castel[2], Nathalie Même[2], Arturo Piñon[1], Agnes Narcy[2]
[1]Animine, Rumilly, France, [2]UMR BOA, INRA, Nouzilly, France

241 **Dimensional profile of broiler tibias is affected by dietary zinc source.**
Marquisha Paul*, Anthony Pescatore, Michael Ford, Tuoying Ao, Karl Dawson
Alltech-University of Kentucky Nutrition Research Alliance, Lexington, Kentucky, United States

242 **The relative bioavailability of inorganic and organic zinc sources for weight gain in broiler chickens.**
Mohammad Pilevar[GS]*, Oluyinka Olukosi
Poultry Science, University of Georgia, Athens, Georgia, United States

243 **Effects of the *in ovo* injection of L-ascorbic acid (AA) on the serum AA concentrations and hatchability of broiler embryos.**
Ayoub Mousstaaid[GS]*, Saman Fatemi, Katie E. Elliott, Abdul Mohssen Alqhtani, David Peebles
Poultry Science, Mississippi State University, Starkville, Mississippi, United States

Microbiology and Food Safety
Chair: Kimberly M. Wilson, Orffa Inc. (USA)
Virtual Session Room XI

244 **Horizontal transmission of *Salmonella* Enteritidis and *Salmonella* Kentucky in experimentally infected laying hens in indoor cage-free housing.**
Richard K. Gast*[1], Deana R. Jones[1], Rupa Guraya[1], Kenneth E. Anderson[2], Darrin M. Karcher[3]
[1]US National Poultry Research Center, USDA-ARS, Athens, Georgia, United States, [2]Poultry Science, North Carolina State University, Raleigh, North Carolina, United States, [3]Animal Science, Purdue University, West Lafayette, Indiana, United States

245 **The efficacy of the aflatoxin B_1-binder Mycofix® Secure demonstrated by serum and feces biomarkers of exposure.**
Nada Jurisic[2], Elisavet Kunz-Vekiru[1, 2], Heidi Schwartz-Zimmermann[2], Justin Fowler[3], Wulf Dieter Moll[1], Franz Berthiller[2], Wolfgang Schweiger*[1]
[1]BIOMIN Research Center, Tulln, Austria, [2]Department for Agrobiotechnology, University of Natural Resources and Life Sciences, Vienna, Austria, [3]Department of Poultry Science, University of Georgia, Athens, Georgia, United States

246 **Gut-derived serotonin modulates *Campylobacter jejuni* colonization *in vitro*.**
Sandip Shrestha[2], Basanta Wagle[2], Rohana Liyanage[2], Annie M. Donoghue[1], Joshua M. Lyte*[1]
[1]USDA-ARS Poultry Production and Product Safety Research Unit, Fayetteville, Arkansas, United States, [2]Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States

247 **Recovery of *Salmonella Enteritidis* and *Campylobacter Coli* from inoculated andincubated hatching eggs.**
Caitlin Harris[GS]*[1, 2], L. N. Bartenfeld Josselson[2], R. J. Buhr[2]
[1]Poultry Science, University of Georgia, Athens, Georgia, United States, [2]USDA-ARS, Athens, Georgia, United States

248 **Whole-genome sequence analysis of multidrug-resistant avian pathogenic *Escherichia coli* (APEC) MS1170 isolated from broiler.**
Tianmin Li[GS]*[1], Claudia Castañeda[1], Mark A. Arick II[2], Chuan-Yu Hsu[2], Aaron Kiess[1], Li Zhang[1]
[1]Poultry Science, Mississippi State University, Starkville, Mississippi, United States, [2]Institute for Genomics, Biocomputing and Biotechnology, Mississippi State University, Starkville, Mississippi, United States

249 **A Microbial Diversity Survey of US Broilers.**
Morouj Al-Ajeeli*, Terry Lester, Brian Lee, Takashi Hamasaki, Walter Blalock, Tia O'Brien, Tomohiro Hamaoka
Calpis America, Peachtree City, Georgia, United States

250 **Effects of conidial concentration and timing on quality index and deoxynivalenol accumulation in corn inoculated with *Fusarium graminearum*.**
Cai m. Wu*, GUANGMANG LIU
Institute of Animal Nutrition, Sichuan Agricultural University, Chendu, Sichuan, China

251 **Effect of pH on PAA efficacy in reducing foodborne pathogens on chicken wings.**
Sasikala Vaddu[GS]*, Jasmine Kataria, Estafania Novoa, Amanda Elisa Moller, Avani Gouru, Manpreet Singh, Harshavardhan Thippareddi
Poultry Science, University of Georgia, Athens, Georgia, United States

252 **Sodium butyrate as potential anti-inflammatory compound to reduce *Salmonella* Enteritidis colonization in chickens.**
Anamika Gupta[GS]*[1], Mohit Bansal[1], Abhinav Upadhyay[2], Narayan Rath[3], Rohana Liyanage[4], Xiaolun Sun[1], Annie M. Donoghue[3]
[1]Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States, [2]University of Connecticut, Storrs, Connecticut, United States, [3]USDA/ARS, Fayetteville, Arkansas, United States, [4]Chemistry & Biochemistry, University of Arkansas, Fayetteville, Arkansas, United States

253 **Effect of Windrow Composting on Salmonella Enteritidis Persistence in Poultry Litter.**
Aidan A. Talorico[GS*1], James Krehling[1], Luis R. Munoz[1], Kaicie S. Chasteen[1], Amrit Pal[1], Matthew Bailey[1], Dianna Bourassa[2], Kenneth Macklin[1]
[1]Poultry Science, Auburn University, Auburn, Alabama, United States, [2]Poultry Science, Auburn University, Auburn, Alabama, United States

254 **Growth of *Campylobacter* spp. and Carbon Dioxide Production in Primary Containers Incubated AnaerobicallyvGrowth of *Campylobacter* spp. and Carbon Dioxide Production in Primary Containers Incubated Anaerobically.**
Arthur Hinton*[1], Nelson Cox[1], Arturo Levican[2]
[1]Poultry Microbiological Safety and Processing Unit, U. S. National Poultry Research Center, Athens, Georgia, [2]Pontificia Universidad Catolica de Valparaiso, Valparaiso, Chile

255 **Development of probe-based multiplex real-time PCR assays for the rapid and accurate detection of avian pathogenic *Escherichia coli*.**
Reshma Ramachandran*[1], Chuan-Yu Hsu[2], Li Zhang[1]
[1]Poultry Science, Mississippi State University, Starkville, Mississippi, United States, [2]Institute for Genomics, Biocomputing and Biotechnology, Mississippi State University, Starkville, Mississippi, United States

256 **Broiler house particulate matter, aerobiome and antibiotic resistant *E. coli* under "raised without antibiotics" production.**
Gregory Zock[GS*1], Lilong Chai[1], Adelumola Oladeinde[1,2], Samuel Aggrey[1], Jasmine Johnson[1], Yangyang Guo[1]
[1]Poultry Science, University of Georgia, Athens, Georgia, United States, [2]U.S. National Poultry Research Center, USDA, Athens, Georgia, United States

257 **New Avian Pathogenic *Escherichia coli* O Serogroup Epidemiology for Poultry Health in Georgia.**
Nicolle Barbieri*[1], Caleb Austin[3], Robert Pasko[1], Aline L. Oliveira[1], Lisa Nolan[2], Catherine M. Logue[1]
[1]Population Health, University of Georgia, Athens, Georgia, United States, [2]Infectious Diseases, University of Georgia, Athens, Georgia, United States, [3]Poultry Science, University of Georgia, Athens, Georgia, United States

258 **Rapid Quantification Validation and Confirmation of *Salmonella* for Comminuted Turkey.**
Savannah Forgey[GS*1], Tyler Stephens[2], Marcos Sanchez[1], April Englishbey[2]
[1]Animal and Food Science, Texas Tech University, Lubbock, Texas, United States, [2]Hygiena, Camarillo, California, United States

259 **Equivalency of peracetic acid to chlorine as a shell egg surface sanitizer.**
Deana R. Jones*[1], Javier S. Garcia[1], Richard K. Gast[1], Garrett E. Ward[2]
[1]US National Poultry Research Center, Egg Safety and Quality Research Unit, USDA Agricultural Research Service, Athens, Georgia, United States, [2]Poultry Science, University of Georgia, Athens, Georgia, United States

260 **Evaluating the efficacy of Peracetic acid on *Salmonella* and *Campylobacter* on chicken wings at various pH levels.**
Jasmine Kataria[GS*1], Sasikala Vaddu[1], Estafania Novoa[1], Gaganpreet Sidhu[1], Harshavardhan Thippareddi[2], Manpreet Singh[1]
[1]Poultry Science, University of Georgia, Athens, Georgia, United States, [2]Poultry Science, University of Georgia, Athens, Georgia, United States

261 **The antibiotics resistant and biofilm forming *Salmonella* species isolated from poultry of tribal areas in Central India.**
Smita Bordoloi[GS*]
Veterinary Microbiology, college of veterinary science Jabalpur, NDVSU, Bhopal, Madhya Pradesh, India

262 **Effect of *Lactococcus lactis* Cell-Free Extract and Bacitracin against Multidrug-Resistant *Salmonella* Heidelberg.**
Brigitta P. Yaputri[UG*1,2], Divek V. T. Nair[2], Anup Kollanoor Johny[2]
[1]Food Science & Nutrition, University of Minnesota Twin Cities, Minneapolis, Minnesota, United States, [2]Animal

Sciences, University of Minnesota Twin Cities, St. Paul, Minnesota, United States

263 **Understanding possible contributing factors of embryonic mortality.**
Claudia DeLeon[UG*1], Maddison Wiersema[1], G. R. Murugesan[2], Shelby Ramirez[2], Basharat Syed[3], Dawn Koltes[1]
[1]Animlal Science, Iowa State University, Ames, Iowa, United States, [2]Biomin America, Overland Park, Kansas, United States, [3]Biomin, Getzersdorf, Austria

264 ***Salmonella* and *Campylobacter* influence the microbiota response of skin-on, bone-in chicken thighs treated with different antimicrobials.**
Dana K. Dittoe[GS*], Kristina M. Feye, Steven Ricke
Food Science, University of Arkansas, Fayetteville, Arkansas, United States

265 **Application of Amplon® in Combination with Peroxyacetic acid for the Reductionof *Salmonella* Typhimurium and *S.* Reading on Skin-on, Bone-in Tom Turkey Drumsticks.**
Elena G. Olson[GS*], Lindsey A. Wythe, Dana K. Dittoe, Kristina M. Feye, Steven Ricke
Food Science, University of Arkansas, Fayetteville, Arkansas, United States

266 ***In ovo* Feeding of Clostridiale Strains Modulate GutMicrobiome.**
Shaymaa M. Abousaad*[2], Ramon Malheiros[1], Peter R.Ferket[1]
[1]Prestage Department of Poultry Science, North Carolina Satate University, Raleigh, North Carolina, United States, [2]Biology, North Carolina A&T State University, Raleigh, North Carolina, United States

267 **Application of cetylpyridinium chloride (CPC) on Poultry Skin for the Reductionof Nalidixic Resistant *Salmonella* Typhimurium and *S.* Infantis on Chicken Skin.**
Elena G. Olson[GS*], Lindsey A. Wythe, Dana K. Dittoe, Kristina M. Feye, Steven Ricke
Food Science, University of Arkansas, Fayetteville, Arkansas, United States

268 **The Effects of Cetylpyridinium Chloride for the Reduction of *Salmonella* Infantis onSkin- on, Bone-in Chicken Thighs.**
Lindsey A. Wythe[UG*], Elena G. Olsen, Kristina M. Feye, Dana K. Dittoe, Steven Ricke
Food Science, University of Arkansas, Fayetteville, Arkansas, United States

269 **Comparison of media for the detection of *Campylobacter jejuni* using a commercial RT-PCR system.**
Aaron Bodie[GS*1], Peter Rubinelli[1], April Englishbey[3], Savannah Forgey[2], Tyler Stephens[3], Steven Ricke[1]
[1]Food Science, University of Arkansas, Fayetteville, Arkansas, United States, [2]Animal and Food Science, Texas Tech University, Lubbock, Texas, United States, [3]Qualicon Diagnostics LLC, A Hygiena Company, New Castle, Delaware, United States

270 **Effect of plant derived antimicrobials in disrupting horizontal transfer of antibiotic resistance gene between multidrug resistant *Salmonella* and commensal *E.coli* in broilerchicks *ex vivo* and *in vivo*.**
Poonam Vinayamohan[GS*1], Abraham J. Pellissery[1], Oliver R. Perrine[1], Atacan Zeran[1], Annie M. Donoghue[2], Kumar Venkitanarayanan[1]
[1]Department of Animal science, University of Connecticut, Storrs, Connecticut, United States, [2]Poultry Production and Product Safety Research Unit, ARS, USDA, Fayetteville, Arkansas, United States

271 **Plant-derived compounds, eugenol, carvacrol, and beta-resorcylic acid reduce *Salmonella* on chicken wings at scalding and chilling conditions.**
Divek V. T. Nair*[1], Shijinaraj Manjankattil[1], Claire Peichel[1], Annie M. Donoghue[2], Kumar Venkitanarayanan[3], Anup Kollanoor Johny[1]
[1]Department of Animal Science, University of Minnesota, Saint Paul, Minnesota, United States, [2]Poultry Production and Product Safety Research, University of Arkansas, Fayetteville, Arkansas, United States, [3]Department of Animal Science, University of Connecticut, Storrs, Connecticut, United States

272 **Effect of plant-derived antimicrobials against drug-resistant *Campylobacter jejuni* in turkey poults.**
Shijinaraj Manjankattil[GS*1], Grace Dewi[1], Claire Peichel[1], Jonathan Frye[2], Anup Kollanoor Johny[1]
[1]Animal Science, University of Minnesota, Saint Paul, Minnesota, United States, [2]Bacterial Epidemiology and

Antimicrobial Resistance Research, USDA ARS, Athens, Georgia, United States

273 **Efficacy of caproic acid, caprylic acid and cuminaldehyde in reducing *Salmonella* Heidelberg on chicken eggs.**

Abraham J. Pellissery*[1], Poonam Vinayamohan[2], Oliver R. Perrine[1], Atacan Zeran[1], Abhinav Upadhyay[1], Annie M. Donoghue[3], Kumar Venkitanarayanan[1]
[1]Animal Science, University of Connecticut, Storrs, Connecticut, United States, [2]Animal science, University of Connecticut, Storrs, Connecticut, United States, [3]Poultry Production and Product Safety Unit, ARS-USDA, Fayetteville, Arkansas, United States

274 ***Salmonella* spp. carried by flying insects in proximity of poultry farms.**

Paul Dawson, Ahmet Buyukyavuz[GS]*
Food, Nutrition and Packaging Sciences, Clemson University, Clemson, South Carolina, United States

Physiology and Reproduction
Chair: Andrew P. Benson, University of Georgia
Virtual Session Room XII

275 **Seminal characteristics of Creole roosters of Mexico in two seasons of the year.**
Rosalía Ordaz-Contreras[UG*1], Fernando González-Cerón[4], Arturo Pro-Martínez[1], Josafhat Salinas-Ruiz[2], Said Cadena-Villegas[3], Juan M. Cuca-García[1], Jaime Gallegos-Sánchez[1], Diego Zárate-Contreras[1], Miguel Á. Matus-Aragón[1], Eliseo Sosa-Montes[4]
[1]Livestock Program, College of Postgraduates Campus Montecillo, Texcoco, State of Mexico, Mexico, [2]College of Postgraduates Campus Cordoba, Cordoba, Veracruz , Mexico, [3]College of Postgraduates Campus Tabasco, Cardenas, Tabasco, Mexico, [4]Animal Science Department, Chapingo Autonomous University, Texcoco, State of Mexico, Mexico

276 **Eggshell color and hatch-variables in eggs from Creole hens of Mexico.**
Leonardo Osio-Orihuela[UG*1], José G. Reyes-Bello[1], Osvaldo Fernández-Ipiña[1], DiegoZárate-Contreras[2], Arturo Pro-Martínez[2], Juan M. Cuca-García[2], Leodán T. Rodríguez-Ortega[3], Fernando González- Cerón[1]
[1]Department of Animal Science, Chapingo Autonomous University, Texcoco, State of Mexico, Mexico, [2]Livestock Program, College of Postgraduates Campus Montecillo, Texcoco, State of Mexico, Mexico, [3]Polytechnic University of Francisco I. Madero, Francisco I. Madero, Hidalgo, Mexico

277 **Broiler Breeder hen sexual maturity and hatching egg production influenced by a phytomolecules-based additive program.**
Twan van Gerwe[1], Henning Gerstenkorn[2], Ajay Bhoyar*[1], Kowsigaraj Palanisamy[3]
[1]Technical Management, EW Nutrition, Visbek, Germany, [2]Product Management, EW Nutrition, Visbek, Germany, [3]Global R & D, EW Nutrition, Visbek, Germany

278 **Bone and Eggshell Quality Through an Extended Laying Cycle in Three Differentially Selected Strains of Laying Hens.**
Charlene Hanlon[GS*], Kayo Takeshima, Gregoy Y. Bedecarrats
Department of Animal Biosciences, University of Guelph, Guelph, Ontario, Canada

279 **Ovarian auto- and allotransplantation in turkeys (*Meleagris gallopavo*) to evaluate surgical techniques and graft rejection.**
George B. Hall[GS*1], Julie A. Long[2], Ben J. Wood[1, 3, 4], Gregoy Y. Bedecarrats[1]
[1]Animal Biosciences, University of Guelph, Guelph, Ontario, Canada, [2]Beltsville Agricultural Research Center USDA, Beltsville, Maryland, United States, [3]Hybrid Turkeys, Kitchener, Ontario, Canada, [4]School of Veterinary Science, The University of Queensland, Gatton, Queensland, Australia

280 **Potentials of physiological parameters to elucidate the internal development of early chick embryos.**
Minoru Takehara[1], Masaya Kishi[1], Atsushi Asano[2], Atsushi Tajima*[2]
[1]Grad. School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki, Japan, [2]Faculty of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki, Japan

281 **Fertile hatching eggs response after treatment of pulsed ultraviolet light.**
Lindsey Bright[UG*2], Joshua Cassar[2], Paul Patterson[2], Edward Mills[2], Ali Demirci[1]
[1]Ag & Biological Engineering, Penn State University, University Park, Pennsylvania, United States, [2]Animal Science, Penn State University, University Park, Pennsylvania, United States

282 **Expression of umami receptors (T1R1/T1R3) in the intestine during the embryonic and post-hatch development in broiler chickens.**
Bingqi Dong[GS*1], Emily Kim[2], Elijah Kiarie[2], Chengbo Yang[1]
[1]Animal Science, University of Manitoba, Winnipeg, Manitoba, Canada, [2]Animal Biosciences, University of Guelph, Guelph, Ontario, Canada

283 **The impact of the sound shock of the embryonic development and physiological traits in chicks embryo.**
Salwan Abdulateef*, Ziyad T. Aldhanki, Thafer Mohammed
Animal Production, University of Anbar, Ramadi, Iraq

284 **Delayed post-hatch feeding induces long-term alterations in intestinal barrier andnutrient transport function in broilers.**
Sofia Bialkowski[GS*1], Liang-en Yu[1], Andrea Toschi[2], Yihang Li[1]
[1]Animal and Food Sciences, University of Delaware, Newark, Delaware, United States, [2]University of Bologna, Bologna, Italy

285 **The effect of short term feed restriction and refeeding on ghrelin, growth hormone, glucose, insulin, and corticosterone concentrations in male broiler chickens.**
Nurudeen O. Taofeek[GS*], Natalia Ceron-Romero, Katherine P. Sanmartin, Elisabeth Embden, Tameka Smith, Aulisea Thomas, Ostavia Cintron, Ethan Vroonland, Martha Verghese, Jorge Vizcarra
Food and Animal Sciences, Alabama A&M University, Huntsville, Alabama, United States

286 **The Effect of a ghrelin receptor agonist (capromorelin) on Feed and Water Intake, Body Weight Gain and Animal Behavior in Female Broad Breasted White Turkeys (*Meleagris gallopavo*).**
Katherine P. Sanmartin[GS*1], Natalia Ceron-Romero[1], Nurudeen O. Taofeek[1], Ethan Vroonland[1], Logan Swanson[1], Martha Verghese[1], Ernst Heinen[2], Jorge Vizcarra[1]
[1]Food and Animal Sciences, Alabama A&M University, Huntsville, Alabama, United States, [2]ELANCO, Greenfield, Indiana, United States

287 **The effect of corticosterone infusion on the concentrations of insulin, ghrelin and glucose in full fed and feed restricted birds (*Gallus gallus domesticus*).**
Natalia Ceron-Romero[GS*], Nurudeen O. Taofeek, Katherine P. Sanmartin, Aulisea Thomas, Ethan Vroonland, Martha Verghese, Jorge Vizcarra
Food and Animal Sciences, Alabama A&M University, Huntsville, Alabama, United States

288 **Effect of hot and cold temperatures on the proliferation and differentiation ofpectoralis major muscle satellite cells from a commercial turkey line.**
Jiahui Xu[GS*1], Gale M. Strasburg[2], Kent M. Reed[3], Sandra Velleman[1]
[1]Department of Animal Sciences, Ohio State University, Wooster, Ohio, United States, [2]Department of Food Science and Human Nutrition, Michigan State University, East Lansing, Michigan, United States, [3]Department of Veterinary and Biomedical Sciences, University of Minnesota, St. Paul, Minnesota, United States

289 **Brain derived neurotrophic factor and extra-hypothalamic corticotropin releasing hormone neurons in the nucleus of hippocampal commissure play functional roles in the avian neuroendocrine regulation of stress.**
Hakeem J. Kadhim[GS*2], Seong W. Kang[1], Wayne J. Kuenzel[1]
[1]Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States, [2]Cell and Molecular biology program, University of Arkansas, Fayetteville, Arkansas, United States

290 **Plasma metabolomics and muscle transcriptomics show potential involvement of vascularity issue for increased *P.major* mixed muscle degradation rate and myodegeneration in myopathy broilers.**
Pramir Maharjan*[1], Jordan Weil[1], Antonio Beitia[1], Katie Hilton[1], Nawin Suesuttajit[1], Cole Umberson[1], Diego Martinez[1], Justina V. Caldas[2], Casey Owens[1], Craig N. Coon[1]
[1]Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, Arkansas, United States, [2]Cobb Vantress, Siloam Springs, Arkansas, United States

Processing and Products
Chair: Wayne D. Daley, Georgia Tech Research Institute
Virtual Session Room II

291 **Lipid and protein oxidation of eggs from hens at different ages stored in different environmental conditions.**
Sarah Maria P. Camargo[1], Deibity A. Cordeiro[1], Frederico L. da Silva[2], Karolyne M. Nascimento[2], Vitor R. Mangerotti[2], Letícia V. Chagas[2], Juliana M. Fonseca[2], Itallo d. Faria[1], Aline M. Racanicci[2], Jose H. Stringhini*[1, 3]
[1]Zootecnia, Universidade Federal de Goias, Goiania, Goias, Brazil, [2]Faculdade de Agronomia e Veterinaria, Universidade de Brasilia, Brasilia, Distrito Federal, Brazil, [3]researchership holder, CNPq, Goiania, Goias, Brazil

292 **Egg quality in hens housed in two different production systems, conventional cage and cage- free: a commercial study.**
Roy R. Hernandez[GS*1], Edgar O. Oviedo-Rondon[4], Ramiro D. Franco[2], Edgar R. Aya[2], Iang Schroniltgen R. Barragán[1, 3]
[1]Poultry Research Group, University of Tolima, Ibague, Tolima, Colombia, [2]Technical Department, Nutriavicola S.A, Cali, Valledel Cauca, Colombia, [3]Immunobiology and pathogenesis research group, University of Tolima, Ibague, Tolima, Colombia, [4]Prestage Poultry Science, North Carolina State University, RALEIGH, North Carolina, United States

293 **A comparison between slow and fast-growing strains of broiler chickens on carcass traits and incidence of wooden breast and white striping.**
Midian Nascimento dos Santos[GS*1], Daniel Rothschild[1], Tina Widowski[1], Elijah Kiarie[1], Ira Mandell[1], Michelle Guerin[2], Stephanie Torrey[1]
[1]Animal Biosciences, University of Guelph, Guelph, Ontario, Canada, [2]Department of Population Medicine, University of Guelph, Guelph, Ontario, Canada

294 **Effect of freezing condition and wooden breast severity on cooked chicken quality.**
Caroline R. Gregg[UG*1], Dawn Koltes[2], Rodrigo Tarte[2]
[1]Iowa State University, Ames, Iowa, United States, [2]Animal Science, Iowa State University, Ames, Iowa, United States

295 **Textural and physical properties of breast fillets with myopathies (wooden breast, white striping, and spaghetti meat) in fast-growing broiler chickens in Canada.**
Chaoyue Wang[GS*2], Sunoh Che[1], Christian Fuchs[3], Shai Barbut[2], Leonardo Susta[1]
[1]Pathobiology, University of Guelph, Guelph, Ontario, Canada, [2]Food Science, University of Guelph, Guelph, Ontario, Canada, [3]Food Safety and Quality assurance, Maple leaf foods, Mississauga, Quebec, Canada

296 **Myowater properties during the first 24 h postmortem and their relationship to final moisture content.**
Giulia Tasoniero*, Hong Zhuang, Brian Bowker
USDA, Agricultural Research Service, Athens, Georgia, United States

297 **A Comparative study on carcass and meat quality traits of three Sri Lankanindigenous chicken strains reared under semi-intensive system.**
Madushika K. Ranasinghe[GS*], D.D. Jayasena
Department of Animal Science, Uva Wellassa University, Badulla, Sri Lanka

298 **Analysis of color variations over time of raw pet treats made from co-products of broiler chicken processing.**
Moses E. Chilenje[UG*1], Marc R. Presume[1], Lindsey F. Spencer[1], Catherine M. Odom[1], Laura J. Garner[1], Amit Morey[1], Robert P. Mason[2], Eric K. Altom[2], Charles W. Starkey[1]
[1]Poultry Science, Auburn University, Auburn, Alabama, United States, [2]Animal Nutrition and Health, Balchem Corp., New Hampton, New York, United States

299 **Evaluation of the textural characteristics of pet treats generated from mixtures of broiler processing co-products.**
Marc R. Presume[GS*1], Lindsey F. Spencer[1], Catherine M. Odom[1], Laura J. Garner[1], Amit Morey[1], Robert P. Mason[2],

Eric K. Altom[2], Charles W. Starkey[1]
[1]Poultry Science, Auburn University, Auburn, Alabama, United States, [2]Animal Nutrition and Health, Balchem Corporation, New Hampton, New York, United States

300 **Immersion Chiller Conditions that Affect Peracetic Acid Half-Life Rates.**
Daniel Sabo*, Stephanie Richter, Marc Zanghi
Georgia Tech Research Institute, Atlanta, Georgia, United States

301 **Alternative Approaches to Broiler Transport: On-Farm Processing System (FPaT).**
Alex V. Samoylov*
Georgia Tech Research Institute ATAS, Georgia Tech, Atlanta, Georgia, United States

302 **Predicting Anatomical Structures to Improve Automated Deboning.**
Louise L. Zhuang[UG]*, Wayne Daley
Food Processing Technology Division, Georgia Tech Research Institute, Atlanta, Georgia, United States

303 **Virtual Reality Robotic Cutting Design Framework.**
Sim Harbert*, Konrad Ahlin, Walker Byrnes, Nadun Ranawaka, Louise Zhuang, Stephanie Richter
Food Processing Technology Division, Georgia Tech Research Institute, Atlanta, Georgia, United States

304 **Differences in bioelectrical properties of breast meat affected with woody breast, whitestriping and spaghetti breast meat between three fast-growing big broiler flocks.**
Jaroslav Valenta[GS]*[2], Aftab Siddiqui[1], Laura J. Garner[1], Amit Morey[1]
[1]Poultry Science, Auburn University, Auburn, Alabama, United States, [2]Animal Science, Czech University of Life Sciences, Prague, Czechia

POSTER SESSIONS

All presenters with posters will be available online during their designated session to chat and answer questions related to their virtual poster.

Poster Session Room

Monday, July 20th

Times are CST	
1:00 PM – 2:30 PM	Animal Well-Being and Behavior
2:00 PM – 3:30 PM	Extension and Instruction
2:30 PM – 4:00 PM	Physiology and Reproduction
3:00 PM – 4:30 PM	Processing and Products

Tuesday, July 21st

Times are CST	
9:00 AM – 10:30 AM	Metabolism and Nutrition: General Nutrition
10:00 AM – 11:30 AM	Metabolism and Nutrition: Vitamins and Minerals
11:00 AM – 12:30 PM	Genetics and Molecular Biology
2:30 PM – 4:00 PM	Metabolism and Nutrition: Amino Acids
3:00 PM – 4:30 PM	Metabolism and Nutrition: Enzymes
3:30 PM – 5:00 PM	Metabolism and Nutrition: Feed Additives

Wednesday, July 22nd

Times are CST	
9:00 AM – 10:30 AM	Immunology, Health and Disease
10:00 AM – 11:30 AM	Management and Production
11:00 AM – 12:30 PM	Microbiology and Food Safety

FUTURE MEETINGS

Poultry Science Association

2021 PSA Annual Meeting
CenturyLink Center
Omaha, Nebraska
July 19-22, 2021

2021 Latin American Scientific Conference
Hotel Bourbon de Foz do Iguaçu
Iguazú Falls, Paraná, Brazil
October 5-7, 2021

2022 PSA Annual Meeting
San Antonio Marriott Rivercenter
San Antonio, Texas
July 11-14, 2022

2023 PSA Annual Meeting
Philadelphia Marriott Downtown
Philadelphia, Pennsylvania
July 10-13, 2023

2024 PSA Annual Meeting
The Galt House Hotel
Louisville, Kentucky
July 15-18, 2024

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