**Auburn University**

1. Pal, A., M. Bailey, A.A. Talorico, J.T. Krehling, **K.S. Macklin**, S.B. Price, R.J. Buhr, and **D.V. Bourassa**. 2021. Impact of poultry litter *Salmonella* levels and moisture on transfer of *Salmonella* through associated *in vitro* generated dust. Poult. Sci. 100:101236.
2. **Bourassa, D.V.,** R.J. Buhr, C.E. Harris, and L.N. Bartenfeld Josselson. 2021. Assessment of stabilized hydrogen peroxide for use in reducing *Campylobacter* levels and prevalence on broiler chicken wings. J. Food Prot. 84:449-455.
3. **Pacheco, W. J.,** D. B. Patiño, J. I. Vargas, J. P. Gulizia, **K. S. Macklin**, and T. J. Biggs. 2021. Effect of partial replacement of inorganic zinc and manganese with zinc methionine and manganese methionine on live performance and breast myopathies of broilers. J. Appl. Poult. Res.<https://doi.org/10.1016/j.japr.2021.100204>
4. De Souza, C., C. Eyng, A. AM. Viott, A. S. de Avila, **W. J. Pacheco**, N. R. Junior, T. L. Kohler, K. I. Tenorio, E. H. Cirilo, and R. V. Nunes. 2021. Effect of dietary guanidinoacetic acid and nucleotides supplementation on growth performances, carcass traits, meat quality and occurrence of myopathies in broilers. Livestock Science. 251: 104659
5. Alfaro, J. F., S. Rodriguez-Zas, B. R. Southey, R. Muntifering, S. P. Rodning, **W. J. Pacheco**, and S. Moisá. 2021. Complete blood count analysis on beef cattle exposed to fescue toxicity and rumen-protected niacin supplementation. *Animals*. *11*(4), 988; <https://doi.org/10.3390/ani11040988>
6. Schnuelle G, E.K. Blythe, R. Cole, S. Taylor, G. F. Alfaro, R. B. Muntifering, **W. J. Pacheco**, S. P, Rodning, and S. J. Moisa. 2021. Evaluation of alterations in uterine blood flow using Doppler ultrasonography in pregnant, genotyped beef cows consuming endophyte-infected tall fescue seeds and supplemented with rumen-protected niacin. J. Vet. Sci. Res. DOI: 10.23880/oajvsr-16000207.
7. Bethonico Terra, M. T., **W. J. Pacheco**, M. Harrison, B. A. McCrea, and R. Hauck. 2021. A survey of coccidia and nematodes in pastured poultry in the state of Georgia Avian Diseases. Avian Diseases. 65(2):250-256
8. Broch, J., V. D. L. Savaris, L. Wachholz, E. H. Cirilo, G. L. S. Tesser, **W. J. Pacheco**, C. Eyng, G. M. Pesti and R. V. Nunes. 2021. Influence of phytate and phytase on performance, bone, and blood parameters of broilers at 42 days old. S. Afr. J. Anim. Sci. 51:160-171.
9. Munoz, L., **W. Pacheco**, R. Hauck and **K. Macklin.** 2021. Evaluation of commercially manufactured animal feeds to determine presence of *Salmonella, Escherichia coli* and *Clostridium perfringens.*  Journal of Applied Poultry Research. 30 (2). <https://doi.org/10.1016/j.japr.2021.100142>
10. A. Corzo, J. Lee, J. I. Vargas, M. Silva, and **W. J. Pacheco**. 2020. Determination of the optimal digestible arginine to lysine ratio in Ross 708 male broilers. J. Appl. Poult. Res. [https://doi.org/10.1016/j.japr.2020.100136](https://doi.org/10.1016/j.japr.2020.1001367)
11. Ovi, F. K., R. Hauck, J. Grueber, F. Mussini, and **W. J. Pacheco**. 2020. Effects of pre-pelleting whole corn inclusion on feed particle size, pellet quality, growth performance, carcass yield, and digestive organ development and intestinal microbiome of broilers between 14 to 42 day of age. J. Appl. Poult. Res. <https://doi.org/10.1016/j.japr.2020.10.012>
12. Ovi, F. K. C. Bortoluzzi, T. J. Applegate, C. R. Starkey, **K. S. Macklin**, A. Morey, **W. J. Pacheco**. 2020. Effects of pre-pelleting whole corn inclusion on broiler performance, intestinal microbiota, and carcass characteristics. J. Appl. Poult. Res. <https://doi.org/10.1016/j.japr.2020.100114>
13. Brooks, L.A., M.A. Bailey, J.T. Krehling, K.S. Chasteen and **K.S. Macklin**. 2021. A comparison of sites colonized in broiler chickens challenged through feed administration with *Salmonella* Enteritidis and *Salmonella* Heidelberg. Foodborne Pathogens and Disease. <https://doi.org/10.1089/fpd.2021.0016>
14. Price, P.T., T. Gaydos, H. Legendre, J. Krehling**, K. Macklin**, and J.C. Padgett. 2021. Production Layer Salmonella Enteritidis control through dry fed pre & probiotic products. Brazilian Journal of Poultry Science, 23, <https://doi.org/10.1590/1806-9061-2020-1418>
15. Talorico, A.A., M.A. Bailey, L.R. Munoz, K.S. Chasteen, A. Pal, J.T. Krehling, **D.V. Bourassa**, R.J. Buhr and **K.S. Macklin.** 2021. The use of Roller Swabs for Salmonella Detection in Poultry Litter. Journal of Applied Poultry Research, 30(3). <https://doi.org/10.1016/j.japr.2021.100163>
16. Carrisosa, M., S. Jin, B.A. McCrea, **K.S. Macklin**, T. Dormitorio and R. Hauck. 2021. Prevalence of select intestinal parasites in Alabama backyard poultry flocks. Animals. 11(4), 939. <https://doi.org/10.3390/ani11040939>
17. Bailey, M.A., J.B. Hess, J.T. Krehling and **K.S. Macklin**. 2021. Broiler performance and litter ammonia levels as affected by sulfur added to the bird’s diet. Journal of Applied Poultry Research, 30(2). <https://doi.org/10.1016/j.japr.2021.100159>
18. Chadwick, E.V., L. MacKay, J.T. Krehling and **K.S. Macklin**. 2020. Inoculation route and serotype after Salmonella recovery in the broiler’s digestive tract. Avian Disease, 64 (4), 467-470

## Peer-Reviewed Abstracts and Proceedings

1. Pal, A., M.R. Riggs, R. Osborne, A. Urrutia Giron, A. Jackson, M.A. Bailey, **K.S. Macklin**, S. Price and **D.V. Bourassa**. Investigation of the potential of aerosolized *Salmonella* Enteritidis on colonization and persistence in broilers from D 3 to 21*.* PSA Annual Meeting, July 18-22, 2021. Virtual.
2. Urrutia Giron, A., A. Pal, A. Jackson, and **D.V. Bourassa**. Application of peroxyacetic acid in combination with an acidifier post-defeathering for reduction of *Campylobacter* from broiler chicken*.* International Association of Food Protection, July 17-21, 2021. Phoenix, AZ.
3. Pal, A., M.A. Bailey, **K.S. Macklin**, and **D.V. Bourassa**. Effect of poultry litter moisture content on litter to dust transfer of *Salmonella.* International Association of Food Protection, July 17-21, 2021. Phoenix, AZ.
4. Osborne, R., A. Pal, A. Jackson, M. Riggs, M. Bailey, and **D.V. Bourassa**. Effect of location and time on microbial load in a poultry processing wastewater stream. International Poultry Scientific Forum, January 25, 2021. Virtual.
5. Pal, A., A. Jackson, A. Urrutia Giron, M. Bailey, A.A. Talorico, J.T. Krehling, **K.S. Macklin**, and **D.V. Bourassa**. Shift in microbial composition of dust during growout of broiler chickens. International Poultry Scientific Forum, January 25, 2021. Virtual.
6. Vargas, J. I., A. Corzo, J. T. Lee, M. Silva, and **W. J. Pacheco**. 2021. Determination of the optimal digestible arginine to lysine ratio in Ross 708 male broilers. Poult. Sci. E-Suppl. 1:120.
7. Gulizia, J. P., S. M. Bonilla, J. I. Vargas, S. J. Sasia, L. C. Smith, and **W. J. Pacheco** 2021. Diets with varying inclusion rates of phytase and energy levels influence broiler performance from 1 to 42 days of age. Poult. Sci. E-Suppl. 1:142.
8. Ayres, V., M. Jackson, S. Cantley, S. J. Rochell, C. Crumpacker, T. Lee, B. Bodle, **W. J. Pacheco**, M. Rueda Lastres, C. A. Bailey, K. N. Gardner, T. Boltz, and J. Moritz. 2021. Multi- experiment evaluation of increasing phytase activity from Optiphos and Optiphos Plus on 21-day broiler performance and tibia mineralization. Poult. Sci. E-Suppl. 1:147.
9. Stafford, E. K., G. Harder, K. M. Downs, J. P. Gulizia, S. J. Sasia, and **W. J. Pacheco**. 2021. Effects of varying corn particle size on broiler performance and organ development from 1 to 21 days of age. Poult. Sci. E-Suppl. 1:210.
10. Gulizia, J. P., S. J. Sasia, S. M. Bonilla, J. I. Vargas, L. C. Smith, J. L. Sandoval, C. W. Starkey, and **W. J. Pacheco**. Evaluation of different particle size analysis methodologies for finely to coarsely ground corn. Poult. Sci. E-Suppl. 1:409P.
11. Bonilla, S. M., J. P. Gulizia, S. J. Sasia, J. I. Vargas, **W. J. Pacheco**, and C. W. Starkey. 2021. Effect of corn particle size on bulk density, angle of repose, and pellet quality. Poult. Sci. E-Suppl. 1:414
12. Harder, G., E. K. Stafford, K. M. Downs, J. P. Gulizia, S. J. Sasia, and **W. J. Pacheco**. 2021. Assessing dietary corn particle size influences on broilers grown from 1 to 21 days of age. Poult. Sci. E-Suppl. 1:415P.
13. Sasia, S. J., J. P. Gulizia, S. M. Bonilla, J. I. Vargas, and **W. J. Pacheco**. 2021. Conditioning temperature directly affects pellet quality. Poult. Sci. E-Suppl. 1:416P.
14. Smith, L. C., S. M. Bonilla, J. P. Gulizia, M. Rueda Lastres, F. K. Ovi, J. Escobar, J. Froetschner, and **W. J. Pacheco**. 2021. Effect of production rate on pellet durability index. Poult. Sci. E-Suppl. 1:417P.
15. Muñoz, L., **W. J. Pacheco**, J. Krehling, K. Chasteen, A. Talorico, **K. Macklin**. 2021. Evaluation of commercially manufactured animal feeds to determine presence of *Salmonella, Escherichia coli* and *Clostridium perfringens*. Abstr. M20. International Poultry Scientific Forum.
16. Adkins, J. B., K. M. Downs, J. P. Gulizia, M. S. Rueda, **W. J. Pacheco**. 2021. Effect of phytase level and form on broiler performance from 1to 21 days of age. M34. International Poultry Scientific Forum.
17. Gulizia, J. P., M. S. Rueda, F. K. Ovi, S. M. Bonilla, L. C. Smith, H. E. Reaves, M. Jackson, O. Gutierrez, **W. J. Pacheco**. 2021. Effect of a commercial heat stable phytase with varying inclusion levels on broiler performance and tibia ash from 1 to 49 days. M35. International Poultry Scientific Forum.
18. Bonilla, S., M. Rueda, C. de Souza, J. Starkey, C. Starkey, **W. J. Pacheco**. 2021. Evaluation of particle size, feed form and pellet diameter on performance and nutrient digestibility of broilers at 39 d of age. M51. International Poultry Scientific Forum.
19. Smith, L. C., S. M. Bonilla, J. P. Gulizia, M. S. Rueda, F. K. Ovi, J. Escobar, J. Froetschner, and **W. J. Pacheco**. 2021. Effect of conditioning temperature and pellet die compression ratio on pellet durability index. M52. International Poultry Scientific Forum.
20. Stafford, E. K., K. M. Downs, J. P. Gulizia, **W. J. Pacheco**. 2021. Influence of varying kudzu leaf meal particle sizes added to a broiler diet. P33. International Poultry Scientific Forum.
21. Bailey, M. A**.**, **Bourassa, D. V**., Krehling, J. T., Munoz, L., Talorico, A., **K.S. Macklin**. 2021. Effects of common litter treatments on *Campylobacter jejuni* cross-contamination in broilers. *International Association of Food Protection Annual Meeting*, July 2021.
22. Munoz, L., M. A. Bailey and **K.S. Macklin**. 2021. Effects of common litter treatments on *Campylobacter jejuni* prevalence in broilers. *Poultry Science 110th Annual Meeting*, Virtual, July 2021.
23. Chasteen, K**., K. Macklin**, J. Krehling and M. Bailey. 2021. Effects of Gypsum Mineral Treatment on Darkling Beetle (Alphitobius diaperinus) Populations in Poultry Litter.International Poultry Scientific Forum, January 2021
24. Talorico, A., J. Krehling, K. Chasteen, L. Munoz, M. Bailey, D. Bourassa, and K**. Macklin.** 2021. Examining the use of sodium formate salts to reduce *Salmonella* Enteritidis persistence in broiler litter. Virtual International Poultry Scientific Forum, January 2021

## Conference Papers, Posters, and Presentations

1. **Pacheco, W. J**. 2021.Optimizing feed quality, digestibility, and production goals. Carolina Feed Industry Association – Fall Nutrition Symposium, Raleigh NC.
2. Hauck R, Carrisosa M, Bethonico Terra M T, McCrea B A, **Macklin K S**. 2021. Epidemiologie von Kokzidien in Geflügel in konventionellen Ställen und in Freilandhaltung [Epidemiology of coccidia of poultry in conventional houses and in free ranging flocks]. In: Tagungsband des 100. Fachgesprächs über Geflügelkrankheiten, Hannover, Germany/virtual. pp 47-49

## Extension Activities and Publications

1. Pal, A., **D.V. Bourassa, K.S. Macklin**, and R.J. Buhr. How dust spreads Salmonella in broiler houses. WATT Poultry USA. August 2021.
2. **Bourassa, D.V**. Impact of chiller water conditions on peracetic acid half-life. WOGS Newsletter, July 2021.
3. **Bourassa, D.V.** Soft, pale, and exudative-like poultry meat. WOGS Newsletter, June 2021.
4. **Bourassa, D.V**. Measurement and importance of meat color. WOGS Newsletter, May 2021.
5. **Bourassa, D.V**. Fostering processor and regulator discussion through HACCP Roundtables. WOGS Newsletter, March 2021.
6. **Bourassa, D.V**. Variations in *Campylobacter* sampling and regulatory compliance. WOGS Newsletter, November 2020.
7. **Bourassa, D.V**. Minimizing PAA in air and improving safety through aqueous ozone. WOGS Newsletter, October 2020.
8. **Pacheco, W. J.**, J. Gulizia, and I. Vargas. 2021. Effect of diet particle size on poultry performance. Alabama A&M & Auburn Universities Extension. ANR-2289.
9. **Pacheco, W. J., K. S. Macklin**, and P. Brown. 2020. Economic Impact of a new feed mill in Alabama. Alabama A&M & Auburn Universities Extension. ANR-2673.
10. Fahrenholz, A. C., **W. J. Pacheco,** C. R.Stark. 2021. Don’t forget maintenance programs. Feedstuffs. August 2021.
11. Stark, C. R., A. C. Fahrenholz, **W. J. Pacheco**. 2021. The future of the feed industry workforce. Feedstuffs. July 2021.
12. **Pacheco, W. J.,** Fahrenholz, A. C., and C. R. Stark. 2021. Factors influencing pellet quality. Feedstuffs. June 2021.
13. **Pacheco, W. J.,** Fahrenholz, A. C., and C. R. Stark. 2021. Bulk load out systems offer advantages when properly configures. Feedstuffs. March 2021.
14. Fahrenholz, A. C., **W. J. Pacheco,** C. R.Stark. 2021. Packaging considerations aid in marketing. Feedstuffs. February 2021.
15. **Pacheco, W. J.,** Fahrenholz, A. C., and C. R. Stark. 2021. Steam generation and boilers 101. Feedstuffs. January 2021.
16. Fahrenholz, A. C., **W. J. Pacheco,** C. R.Stark**.** 2020. Managing feed mill in midst of pandemic. Feedstuffs. Vol. 92(12). page 24.
17. **Pacheco, W. J.,** Fahrenholz, A. C., and C. R. Stark. 2020. Maintaining production, feed quality balance. Feedstuffs. Vol. 92(11). page 24.
18. Fahrenholz, A. C., **W. J. Pacheco,** C. R.Stark. 2020. How do subordinates know what you know. Feedstuffs. Vol. 92(10), page 28.
19. **Macklin. K.,** J. Hess and G.R. Strother. 2020. Poultry Pest Management. Poultry Times, Dec. 21, 2020. 57-63

**University of Arkansas**

## Peer-Reviewed Publications

## Liang, Y. 2021. Energy-smart poultry farming. In Energy-smart Farming: Efficiency, Renewable Energy and Sustainability. Sims (ed.), Chapter 18. Burleigh Dodds Science Publishing, In print.

## Liang, Y., G.T. Tabler, and S. Dridi. 2020. Sprinkler technology improves broiler production sustainability: From stress alleviation to water usage conservation: a mini review. Front. Vet. Sci. 22 September 2020. https://doi.org/10.3389/fvets.2020.544814

## Maharjan, P., and Y. Liang. 2020. Precision livestock farming: The opportunity in poultry sector. J. Agric. Sci. Tech. A 10: 45-53. doi: 10.17265/2161-6256/2020.02.001.

## Peer-Reviewed Abstracts and Proceedings

Liang, Y., M. Janorschke, and C.E. Hayes. 2021. Low-cost solar collectors to pre-heat ventilation air in broiler buildings. ASABE Annual Meeting Paper # 2100619. ASABE. St. Joseph, MI.

## Conference Papers, Posters, and Presentations

Moon, J.W., J. DuBien, A.T. Brown, Y. Liang, and T. Tabler. 2021. Water conservation and production benefits of sprinkling broilers. Abstract in 2021 International Poultry Scientific Forum, January 25-26, Atlanta, GA

Liang, Y., C.E. Hayes, and S.C. Crafton. 2021. Can facial temperature be used to monitor heat stress of broilers? Abstract in 2021 International Poultry Scientific Forum, January 25-26, Atlanta, GA.

## Extension Activities and Publications

Liang, Y., T. A. Costello, R. Bautista. 2020. Energy consumption and conservation opportunity for Arkansas broiler production. Factsheet 1099. University of Arkansas Division of Agriculture.

Liang, Y., G.T. Tabler. 2020. Litter management for broiler production. Factsheet 1098. University of Arkansas Division of Agriculture.

Tabler, T., Y. Liang, J. Moon, J. Wells. 2020. Broiler litter: odor and moisture concerns. Publication 3515, Mississippi State University Extension.

**University of Connecticut**

* Amalaradjou, MA; Upadyaya, I; Boney, J. A; Darre, M. A comprehensive probiotic-based approach to promote layer performance, layer health and egg safety for small and midsize farms. USDA NIFA. 2021-2025. $500,000.
* Amalaradjou, MA; Upadhyaya, I. In ovo and early probiotic supplementation to control *Salmonella* in broilers. USDA NIFA SARE. 2021-2024. $150,000.
* Venkitanarayanan, K., Darre, M., Amalaradjou, MA., Upadhyay, A., Upadhyay, I., Luo, Y., Martin, G., Boney, J., Lillehoj, H., Porter, T., Weimer., S., Moyle, J., Thakur, S., Ashwell, C., Kolar, P., Boyes, K., Pairis-Garcia, M., Borst, R., Liang, K., Fasina, Y., Fanatico, A., Czarick, M., Fairchild, B., Ramos, J., Rojas, M., Donoghue, A,, Moore, P., Ashworth, A., Lyte, J., Dridi, S., Arsi, K., Bramwall, S., Kommalapati, R., Mooyottu, S., Tangudu, C., Johny, A. Systems-based integrated program for enhancing the sustainability of antibiotic-restricted poultry production. USDA NIFA. 2020-2025. $10,000,000.
* Sartini, B; Upadhyay, A; Upadhyaya, I. Developing Evidence-based Handling Guidelines for Improving the Safety of Free- range Poultry Eggs. USDA-NIFA-AFRI. 05/2021- 04/2023. $200,000.
* Upadhyay, A., Upadhyaya, I., Ghimire, S. Enhancing the Safety of Eggs and Fresh Produce by Novel Ultra-fine Bubble Technology and Farmer Training. NE-SARE. 03/2020 – 02/2023. $150,000.
* Amalaradjou, MA; Darre, M; Reed, S., Mandoiu, I. Effects of in-ovo probiotic supplementation on muscle growth and performance in broilers. USDA NIFA. 2020-2022. $200,000.

Abstracts:

Allen, J., Balasubramanian, B., Rankin, K., Shah, T., Donoghue, A., Upadhyaya, I., Luo, Y., Upadhyay, A.(2021). Efficacy of Trans-cinnamaldehyde nanoemulsions in inactivating *Salmonella* Enteritidis on shelled eggs and chicken skin. Presentation/Published abstract- Poultry Science Association Virtual Annual Meeting, July 19-22, 2021.

Shah, T., Balasubramanian, B., Upadhyaya, I., Venkitanarayanan, K., Upadhyay, A.(2021). Effect of Trans-cinnamaldehyde, Eugenol and Carvacrol on *Salmonella* Enteritidis proteome critical for colonization in chickens. Presentation/Published abstract- Poultry Science Association Virtual Annual Meeting, July 19-22, 2021.

**University of Georgia**

## Peer-Reviewed Publications

1. Guo, Y., S. Aggrey, A. Oladeinde, J. Johnson, G. Zock. **L. Chai** (2021). A Machine Vision-Based Method Optimized for Restoring Broiler Chicken Images Occluded by Feeding and Drinking Equipment. *Animals*.11 (1), 123.
2. Oladeinde, A, Z. Abdo, M. Press, **L. Chai**, C. Ritz (2021). Horizontal gene transfer is the main driver of antimicrobial resistance in broiler chicks infected with Salmonella enterica serovar Heidelberg. *mSystems*, 6 (4): e00729-21.
3. Wan, Y., R. Ma, A. Khalid, **L. Chai**, et al. (2021). Effect of the pellet and mash feed forms on the productive performance, egg quality, nutrient metabolism, and intestinal morphology of two laying hen breeds. *Animals*. 11 (3): 107.
4. Johnson, J., B. Zwirzitz, A. Oladeinde, M. Milfort, T. Looft, **L. Chai**, G. Zock, M. Sommers, S. Tunim, and S. E. Aggrey. 2021. Succession patterns of the bacterial community in poultry litter after bird removal and sodium bisulfate application. *Journal of Environmental Quality*. 50:923–933.
5. Subedi S., S. Koirala, **L. Chai** (2021). COVID-19 in Animals: Host Susceptibility and Farm Prevention Strategies. *Animals*, 11 (3), 640.
6. Guo, Y., **L. Chai**, S. Aggrey, A. Oladeinde, J. Johnson, G. Zock. (2020). A Machine Vision-Based Method for Monitoring Broiler Chicken Floor Distribution. *Sensors*. 20(11), 317.
7. Guo, Y., J. Guo, C. Liu, H. Xiong, **L. Chai**, D. He. 2020. Precision Landing Test and Simulation of the Agricultural UAV on Apron. *Sensors 20 (12), 3369.*

## Peer-Reviewed Abstracts and Proceedings

1. T. Looft, L. Chai, G. Zock. (2021). Succession patterns of poultry litter microbiota after bird removal and PLT® application. 2021 International Poultry Scientific Forum. Abstract # M25, page 9.
2. Zock, G., L. Chai, A. Oladeinde, S. Aggrey, J. Johnson, Y. Guo. (2020). Broiler house particulate matter, aerobiome and antibiotic resistant E. coli under “raised without antibiotics” production. *Poultry Science* 99 (E-suppl. 1), 125. (2020 Poultry Science Association Meeting abstract)
3. Guo, Y., L. Chai, S. Aggrey, A. Oladeinde, J. Johnson, G. Zock. (2020). A machine vision-based method for monitoring broiler floor distribution in feeding and drinking zones. *Poultry Science* 99 (E-suppl. 1), 19. (2020 Poultry Science Association Meeting abstract)

## Conference Papers, Posters, and Presentations

1. Chai, L., C. Dunkley, C. Ritz. Air Quality in Commercial Broiler Breeder Houses. (2021) ASABE Annual International Meeting paper. Paper # 2100141.
2. Guo, Y, L. Chai. (2021). Monitoring Animal Group Distribution Index with the Machine Vision-Based Technology in the Poultry House. 2021. ASABE Annual International Meeting paper. # 2101234.
3. Guo, Y., L. Chai, D. He. 2020. Detection of broiler chicken population and distribution on pen floor using machine vision-based technology. 2020 ASABE Annual International Virtual Meeting-2000198 (doi:10.13031/aim.202000198).
4. Chai, L, B. Jia, Y. Guo, G. Zock. Imaging Techniques for Chicken Products Detection. 2020 ASABE Annual International Virtual Meeting-2000127 (doi:10.13031/aim.202000127).

## Extension Activities and Publications

1. Coordinator, 2021 Georgia Precision Poultry Conference -Virtual. May 4, 2021.

(Initiated by Chai; the conference had 322 registered participants globally from over 30 different countries).

1. Facilitator of Layer Production Module, 2021 Georgia International Poultry Training. Feb. 16-18, 2021. (192 registered participants for the Layer Production Module).
2. Coordinator, 2020 Georgia Layer Conference-Virtual. September 21, 2020.

**University of Kentucky**

Publications

Adedokun, S. A. and O. Adeola. 2020. Regression-derived ileal endogenous amino acid losses in broiler chickens and cannulated pigs fed corn fiber, wheat bran, and pectin. Animals. doi: https://doi.org/10.3390/ani10112145

Dunaway, A. and S. A. Adedokun. 2021. Coccidia vaccine challenge and exogenous enzyme supplementation in broiler chicken 1. Effect on digesta viscosity, diet energy utilization, and apparent metabolizable energy value of wheat. Animals 11, 641. <https://doi.org/10.3390/ani11030641>

Abstracts

Adefioye, R., M. Lindemann, M. Azain, M. Ford, A. Pescatore, and S. Adedokun. 2021. Effects of oil quality, phytase and vitamin E supplementation on the growth performance, nutrient utilization and relative fat and liver weight in 21-day-old broiler chickens. Presented at the Poultry Science Association Meeting (virtual).

Adefioye, R., M. Lindemann, M. Ford, A. Pescatore, and S. Adedokun. 2021. The effect of oil type, oil quality, and vitamin E supplementation on the performance, relative fat and liver percentages, and the apparent nitrogen and crude fat utilization in 21-day-old broiler chickens. Presented at the International Poultry Scientific Forum, Atlanta, GA (virtual).

Ao, Tuoying, Marquisha Paul, Anthony Pescatore, Daniel Graugnard, Lizza Macalintal, Rebecca Delles, Mike Ford, Ronan Power. 2021 Dietary Allzyme® Spectrum improved the performance of broiler chickens fed low nutrient diet. Presented at the Poultry Science Association Meeting (virtual).

Delles, Rebecca, Tuoying Ao, Marquisha Paul, Anthony Pescatore, Mike Ford, Daniel Graugnard, Ronan Power. 2021. The impact of dietary supplementation of NuPro® in the starter diets on the 21-day growth performance of broiler chickens. Presented at the Poultry Science Association Meeting (virtual).

**University of Maryland**

Meeting Abstracts, Journal Articles, and Theses

Snyder, A. M, T. Johnson, and S. L. Weimer. Evaluating the differences in growth rate and body weight of fast-growing versus slow-growing broilers when challenged with *Salmonella typhimurium*. International Poultry Scientific Forum virtual meeting. January 25-26, 2021.

Magnaterra, A., R. Mitchell, Z. McMillian, A. Snyder, and S. Weimer. Leg infrared surface temperatures and tibia morphology show quantitative differences in broilers with normal compared to abnormal gaits. International Poultry Scientific Forum virtual meeting. January 25-26, 2021.

Snyder, A., T. A. Johnson, C. I. Robison, and S. L. Weimer. Evaluating differences in gut morphology and sickness behavior in fast and slow growing broiler chickens when infected with *Salmonella enterica* serovar Typhimurium. Poultry Science Association virtual meeting. July 19-22, 2021. (*oral*)

Magnaterra, A., R. Angel, and S. Weimer. Tibial morphology and production of broilers provided enrichments and spotlights. Poultry Science Association virtual meeting. July 19-22, 2021.

McMillian, Z., J. Moyle, and S. Weimer. Increasing welfare by placing circulation fans in commercial broiler houses. Poultry Science Association virtual meeting. July 19-22, 2021

Khong, M., N. Barbieri, A. Snyder, A. Magnaterra, and S. Weimer. Identification and characterization of *Escherichia coli* isolates from poultry litter. Poultry Science Association virtual meeting. July 19-22, 2021.

Weimer, S., R. Wideman, C. Scanes, A. Mauromoustakos, K. Christensen, and Y. Vizzier-Thaxton. 2020. Broiler stress responses to light intensity, flooring type, and leg weakness as assessed by heterophil-to-lymphocyt ratios, serum corticosterone, infrared thermography, and latency to lie. Poultry Science 99:3301-3311. DOI: 10.1016/j.psj.2020.03.028.

Weimer, S. L., A. Mauromoustakos, D. M. Karcher, and M. A. Erasmus. 2020. Differences in performance, body conformation, and welfare of conventional and slow-growing broilers raised at 2 stocking densities. Poultry Science 99:4398-4407.DOI: 10.1016/j.psj.2020.06.009.

Abraham, M. E., S. L. Weimer, K. Scoles, J. I. Vargas, T. A. Johnson, C. Robison, L. Hoverman, E. Rocheford, T. Rocheford, D. Ortiz, and D.M. Karcher. 2021. Orange corn diets associated with lower severity of footpad dermatitis in broilers. Poultry Science*.* 100:101054.DOI: 10.1016/j.psj.2021.101054.

Weimer, S. L., R. F. Wideman, C. G. Scanes, A. Mauromoustakos, K. D. Christensen, and Y. Vizzier-Thaxton. 2021. Impact of experimentally-induced bacterial chondronecrosis with osteomyelitis (BCO) lameness on health, stress, and leg health parameters in broilers. DOI: [10.1016/j.psj.2021.101457](https://doi.org/10.1016/j.psj.2021.101457).

Snyder, A. M. 2021. Evaluating differences in body weight, gut morphology, immune response, and sickness behavior in fast- and slow-growing broiler chickens when infected with *Salmonella Enterica* serovar Typhimurium. MS Thesis. University of Maryland.

Perdue, M., Moyle, J., Escobar, E., International Poultry Scientific Forum, "Small flock programming during a pandemic," Virtual, United States. (January 25, 2021).

Extension Talks, Workshops, Bulletins, Columns, and Newsletters

Weimer, S. Thoughts on Animal Welfare. Mid-Atlantic Women in Agriculture Wednesday Webinars. University of Maryland Extension. September 9, 2020.

Weimer, S. Poultry Welfare: Perceptions and Research Innovations. H&N Genetics Distributor Meeting. Virtual Meeting. October 8, 2020.

Weimer, S. Why is *Salmonella* making more people sick? (Poultry Welfare). The Delmarva Farmer. November 25, 2020.

Moyle, J., Tablante, N., Rhodes, J., Weimer, S., and Ghanem, M. 2020. Be on alert for Coryza infecting poultry. Urban Ag E-News:4.

Weimer, S. 2020. Animal welfare is the key to the sustainability of the poultry industry. Poultry Extension Collaborative. Poultry Extension Collaborative. 2: May 2020 Newsletter.

Weimer, S., M. Erasmus, L. Jacobs, and P. Regmi. 2020. Mail-order chicks during the COVID-19 pandemic. Poultry Extension Collaborative. August 2020 Special Issue Newsletter.

Snyder, A. and S. Weimer. 2020. *Salmonella* in backyard poultry. Poultry Extension Collaborative. 6: September 2020 Newsletter.

Rhodes, J. and S. Weimer. You Started a Small Flock, So What Now? University of Maryland Extension. What’s That Smell? Understanding Agriculture and What Officials Need to Know Workshop. October 27, 2020.

Magnaterra, A. and S. Weimer. 2021. A bird’s eye view: the chicken visual system. Poultry Extension Collaborative. 10: January 2021 Newsletter.

Weimer, S. Happy Hens. Backyard Farming Zoom Sessions. University of Maryland Extension. April 23, 2021.

McMillian, Z. and S. Weimer. 2021. Chicken vocalizations. Poultry Extension Collaborative. 14: May 2021 Newsletter.

Poultry Extension Collaborative. Webinar: Global standards and research advances in poultry welfare. Virtual. May 25, 2021.

Weimer, S. What can chickens tell us? (Poultry Welfare). The Delmarva Farmer. May 28, 2021.

Weimer, S. The Poultry Industry: Animal Welfare and Sustainability. Mississippi Poultry Association Breeder and Hatchery Virtual Workshop. August 10, 2021.

Moyle, J. R. 2021. Antimicrobial Use and Poultry Management. Livestock and Poultry Environmental Learning Community. Virtual meeting August 20, 2021.

Moyle, J. R. 2021. Animal Feed Mix – small scale processing and mixing. Network of Christian Agricultural Professionals. Whitestown, Indiana August 11, 2021.

Moyle, J. R., and Rhodes, J. L. Being Good Neighbors. For Delaware Ag Month, Commercial Grower Seminar, Harrington, Delaware, January 20, 2021, virtual.

Moyle, J., Delaware Ag Month, "Backyard Chicken 911," Delaware Department of Ag. January 22, 2021 virtual.

Moyle, J. R. Breeder Management – Chick Quality. Ready, Set, Hatch! Virtual meeting series. January 6, 2021, virtual.

Moyle, J., Ghanem, M., Perdue, M. 2021 Common Crop Issues in Backyard Chickens Extension Publication University of Maryland Extension.

Tabler, T., J. R. Moyle, J. Rhodes, S. L. Weimer, J. Wells, and J. Moon. 2021. Poultry beginnings: Raise your own backyard chickens. Mississippi State Extension. P3624.

Moyle, J., Felton, G., "Poultry Mortality Composting Short Course - Virtual", July 13, 2021.

Moyle, J., Sater, H., "Vegetative Buffers Demo Day", June 9, 2021.

Tablante, N., Perdue, M., Moyle, J., "Backyard Farming Flock Friday Poultry Diseases", Webinar. April 16, 2021.

Semler, J., Perdue, M., Moyle, J., "Backyard Farming Flock Fridays Chicken Gardening", Webinar. April 9, 2021.

Goeringer, P., Perdue, M., Moyle, J., "Backyard Farming Flock Fridays Legal Issues", Webinar. March 26, 2021.

Rhodes, J., Bush, C., Rhodes, R., Perdue, M., Moyle, J., "Backyard Farming Flock Friday Farm to Fridge". Webinar, March 19, 2021.

Moyle, J., Perdue, M., Rhodes, J., "Backyard Farming Flock Friday Chicken Mail", Webinar. March 12, 2021.

Moyle, J., Perdue, M., "Backyard Farming-Poultry 911", Webinar. December 4, 2020.

Moyle, J., Perdue, M., "Pasture Poultry Backyard Farming", Webinar. December 18, 2020.

Moyle, J., "Prepare for natural disasters on commercial farms". The Delmarva Farmer. May 28, 2021.

Moyle, J., "Staying safe with poultry (Backyard flocks)". The Delmarva Farmer. February 26, 2021.

Moyle, J., "Winter Weather and Small Flocks". The Delmarva Farmer. November 30, 2020.

Moyle, J., "Good Neighbor Relations". The Delmarva Farmer. October 30, 2020.

**Michigan State Universit**y

## Peer-Reviewed Abstracts and Presentations

Grebey, T, Swanson, J, Widowski T, Siegford J. 2021. Daily morning litter restriction: variation in dust bathing patterns among 4 genetic strains of laying hen. 54th Congress of the International Society for Applied Ethology. August, 2021. (talk, abstract in proceedings)

Rentsch, A, Harlander, A, Niel, L, Siegford, J, Widowski, T. 2021. Effect of brooding compartment design on physical abilities of laying hen chicks. 54th Congress of the International Society for Applied Ethology. August, 2021. (talk, abstract in proceedings)

## Extension Activities and Publications

## Siegford, J. 2021. Research Update: Laying Hens. Presentation and discussion at the Michigan Allied Poultry Industries: MSU Investigator Advisory Committee, Grand Rapids, MI, May 2021.

**Penn State University**

## Peer-Reviewed Publications

Erb, L. S., Lyons, A. M., Poholsky, C. V., Dirks, B. P., Boney, J. W. (2021). Effects of direct-fed microbial (Bacillus subtilis C-3102) inclusion on tom turkey production efficiency and intestinal microbial populations. Journal of Applied Poultry Research. <https://doi.org/10.1016/j.japr.2021.100207>

Poholsky, C., Hofstetter, D. W., Khezrimotlagh, D., Boney, J. W. (2021). Effects of pellet quality to on-farm nutrient segregation in commercial broiler houses varying in feed line length (100157th ed., vol. 30, pp. 17). Journal of Applied Poultry Research. <https://doi.org/10.1016/j.japr.2021.100157>

Chen, L., E. Fabian-Wheeler, J. Cimbala, D. Hofstetter and P. Patterson. 2021. Computational Fluid Dynamics Study of Alternative Ventilation Schemes in Cage-Free Poultry Housing. Animals. *11*(8), 2352; <https://doi.org/10.3390/ani11082352>

[Patterson](https://pubmed.ncbi.nlm.nih.gov/?term=Patterson+PH&cauthor_id=34237547), P.H., [N. Acar](https://pubmed.ncbi.nlm.nih.gov/?term=Acar+N&cauthor_id=34237547), [A. D. Ferguson](https://pubmed.ncbi.nlm.nih.gov/?term=Ferguson+AD&cauthor_id=34237547), [L. D. Trimble](https://pubmed.ncbi.nlm.nih.gov/?term=Trimble+LD&cauthor_id=34237547), [H. B. Sciubba](https://pubmed.ncbi.nlm.nih.gov/?term=Sciubba+HB&cauthor_id=34237547), [E. A. Koutsos](https://pubmed.ncbi.nlm.nih.gov/?term=Koutsos+EA&cauthor_id=34237547). 2021. The impact of dietary Black Soldier Fly larvae oil and meal on laying hen performance and egg quality.Poultry Sci. 100(8):101272. doi: 0.1016/j.psj.2021.101272.

[Cassar J. R.,](https://www.sciencedirect.com/science/article/pii/S0032579120309743" \l "!) [L.M. Bright,](https://www.sciencedirect.com/science/article/pii/S0032579120309743#!) [P.H. Patterson,](https://www.sciencedirect.com/science/article/pii/S0032579120309743#!) [E.W. Mills and](https://www.sciencedirect.com/science/article/pii/S0032579120309743#!) [A. Demirci](https://www.sciencedirect.com/science/article/pii/S0032579120309743" \l "!). 2021. The efficacy of pulsed ultraviolet light processing for table and hatching eggs. Poultry Sci. 100(3) March 2021, 100923. <https://doi.org/10.1016/j.psj.2020.12.021>

Sellers, R. B., Brown, A. T., Boney, J. W., McDaniel, C., Moritz, J. S., Wamsley, K. G.S. (2020). Impact of feed form, liquid application method, and feed augering on feed quality, nutrient segregation, and subsequent broiler performance. Journal of Applied Poultry Research*.* 29:895-916. <https://doi.org/10.1016/j.japr.2020.09.001>

Beining Ouyang, B., A. Demirci and P.H. Patterson. 2020. Inactivation of Escherichia coli K12 in Liquid Egg White by a Flow-Through Pulsed UV Light Treatment System. Journal of Food Protection, 83:418-425.

## Peer-Reviewed Abstracts and Proceedings

Poholsky, C. V., Watt, M. L., Erb, L. S., Lyons, A. M., Boney, J. W. (2021). Effects of improvements to pellet quality on commercial hen turkey performance and processing parameters. Poult. Sci. Vol. 100 (E-suppl. 1):222.

Lyons, A. M., Erb, L. S., Poholsky, C. V., Patterson, P. H., Boney, J. W. (2021). Effects of soybean meal particle size on feed milling efficiency, pellet quality, broiler performance (D1-42) and processing characteristics. Poult. Sci. Vol. 100 (E-suppl. 1):216.

Erb, L. S., Lyons, A. M., Poholsky, C. V., Dirks, B. P., Boney, J. W. (2021). Effects of direct-fed microbial inclusion on production parameters and intestinal microbial population changes in Nicholas Select tom turkeys. Poult. Sci. Vol. 100 (E-suppl. 1):172.

Lyons, A. M., Erb, L. S., Poholsky, C., Patterson, P. H., Boney, J. W. (2021). The impact of soybean meal particle size on milling efficiency, broiler digestibility and subsequent performance.Poult. Sci. Vol. 100(E-suppl. 1): M66.

Erb, L. S., Poholsky, C., Lyons, A. M., Boney, J. W. (2021). Effects of Mushroom Stump Waste (MSW) inclusions to broiler diets on amino acid digestibility and d1-21 performance. Poult Sci. Vol. 100 (E-suppl. 1):M65.

Poholsky, C., Hofstetter, D. W., Khezrimotlagh, D., Boney, J. W. (2021). Effects of pellet quality to on-farm nutrient segregation in broiler houses varying in feed line length. Poult. Sci. Vol. 100 (E-suppl. 1): M56.

Patterson, P. H., N. Acar, X. F. Averos, I. Pineda, I. Estevez. 2020. Impact of natural beak smoothing feeders and outdoor vegetation density on pullet performance and welfare parameters. Poultry Sci. 99: 58, E-suppl. 1.

Bright, L., J. Cassar, P. Patterson, E. Mills and A. Demirci. 2020. Fertile hatching eggs response after treatment of pulsed ultraviolet light. Poultry Sci. 99:137-138, E-suppl. 1.

Trimble, L., A. Ferguson, B. Migdal, M. Pasquinelli, N. Acar, P.H. Patterson. 2020. The Impact of Dietary Beta-Glucans on Poultry Health and Performance. Poultry Sci. 99:88-89, E-suppl. 1.

Averos, X., P. Patterson, N. Acar, I Pineda, and I. Estevez. 2020. Are Beak Growth and Pullet Performance Affected by the Combined Effects of Natural Beak Smoothing Feeders and Outdoor Vegetation Density? Poultry Sci. 99:15-16, E-suppl. 1.

Patterson, P.H., X. Averos, N. Acar, I Pineda, and I. Estevez. 2020. Impact of Vegetation Density on Outdoor Paddock Utilization and Behavior by Growing Pullets. Poultry Sci. 99:16, E-suppl. 1.

Cassar, J. R., L. M. Bright, P.H. Patterson, E.W. Mills, and A. Demirci. 2021. Pulsed ultraviolet light processing for microbial reduction of table and fertile shell eggs. Abstract 20-072,Northeastern Agricultural and Biological Engineering Conference.

Patterson, P. H., N. Acar and E. A. Koutsos. 2021. Impact of dietary Black Soldier Fly larvae on laying hen performance, egg quality and lipid profile. Abstract no. 36395, Annual European Federation of Animal Science Meeting (EAAP) Annual Meeting, Davos, Switzerland.

Loyola, C., C. Papadimitriou, P. Patterson, M. McBride, and P. Pearson. 2021. Environmental opportunities and trade-offs of using feedstuffs for laying hens: LCA of three pathways. Abstract no. 36383, Annual European Federation of Animal Science Meeting (EAAP) Annual Meeting, Davos, Switzerland.

## Extension Activities and Publications

Erb, L. S., Boney, J. W. *Effects of Mushroom Stump Waste (MSW) Inclusions in Broiler Diets on d1-21 Performance and Apparent Ileal Amino Acid Digestibility* (10th ed., vol. 68). Avondale, PA: Mushroom News.

Boney, J. W. (2020). *A Balanced Approach to Maximize Feed Hygiene, Pellet Quality, and Nutrient Availability* (1st ed., vol. 14, pp. 2). University Park: Quality Technology International, Inc.

Patterson, P.H., and C. M. White (2020) Poultry Manure as a Garden Amendment. Penn State Extension 2pp.

## Dissertation, Thesis and Book Chapters

L.S. Erb Thesis: Evaluating the inclusions of sustainable alternatives to conventional feeding strategies in poultry nutrition. May 2021.

C.M. Poholsky Thesis: Effects of pellet quality to on-farm nutrient segregation and subsequent broiler performance and monitoring turkey breast meat quality using instrumental analysis. May 2021.

J. R. Cassar, Ph.D. Thesis: Application of Pulsed Light in Food Processing. June, 2021.

Koutsos, E. A., P. H. Patterson, K. Livingston and T. Freel: Book Chapter: 2021. The Role of Insects for Poultry Feed: Present and Future Perspective. *In* Mass Production of Beneficial Organisms: Invertebrates and Entomopathogens, 2nd Edition, Dr. Morales-Ramos, Editor. Elsevier, Cambridge, MA.

Ferguson, A. D. PSU Millennium Scholars Program Thesis: Black Soldier Fly Larvae, Meal and Oil as Dietary Ingredients for Laying Hens. May, 2020.