Annual Report 2020 -- Multi-State Project S-1074

## Publications

### Journal Articles

1. Wang, L., L. Chen, S. Wu, and A. Krosuri. 2019. Non-airtight fermentation of dairy manure with waste potato peels and subsequent phosphorus recovery via struvite precipitation. Applied Biochemistry and Biotechnology (<https://doi.org/10.1007/s12010-019-03133-8>)
2. Wang, L., L. Chen, and S. Wu. 2019. Nuntrient reduction of dairy manure through solid-liquid separation with flocculation and subsequent microalgal treatment. Applied Biochemistry and Biotechnology (<https://doi.org/10.1007/s12010-019-03185-w>)
3. Kruger, K., B. He, and L. Chen. 2019. Growth and nutrient uptake rates of duckweed cultivated on anaerobically digested dairy manure. Chinese Journal of Eco-Agriculture, Sep. 2019, 27(9): 1402-1408. (DOI: 10.13930/j.cnki.cjea.190251)
4. Xu, S., J. Zhu, Z. Meng, W. Li, S Ren, T. Wang. 2019. Hydrogen and methane production by co-digesting liquid swine manure and brewery wastewater in a two-phase system. *Bioresource Technology* 293: 122041. DOI: https://doi.org/10.1016/j.biortech.2019.122041.
5. Zhu, J., S. Wu, J. Shen. 2019. Anaerobic co-digestion of poultry litter and wheat straw affected by solids composition, free ammonia, and carbon/nitrogen ratio. *J. Environ. Sci. Health Part A* 54(3): 231-237.
6. Ajayi-Banji, A. A., S. Rahman, L. Cihacek, and N. Nahar. 2020. Comparison of the reactor performance of alkaline-pretreated corn stover co-digested with dairy manure under solid-state. *Waste and Biomass Valorization* (accepted).
7. Ajayi-Banji, A. A., S. Rahman, S. Sunoj, and C. Igathinathane. 2020. Impact of corn stover particle size and C/N ratio on reactor performance in solid-state anaerobic co-digestion with dairy manure. *Journal of the Air and Waste Management Association,* 70(4): 436-454
8. Sarker, N. C., Md. Borhan, A. Fortuna, and S. Rahman. 2019. Understanding gaseous reduction mechanisms in swine manure resulting from nanoparticle treatments under anaerobic storage conditions, *Journal of Environmental Sciences.* 82: 179-191
9. Sarker, N. C., S. Rahman, Md. Borhan, P. Rajasekaran, S. Santra, and A.Ozcan. 2019. Nanoparticles in mitigating gaseous emissions from liquid dairy manure stored under anaerobic condition, *Journal of Environmental Sciences,* 76: 26-36.
10. 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), 3179.
11. Guo, Y., J. Guo, C. Liu, H. Xiong, L. Chai\*., D. He\*. (2020). A Precision Method for Landing Control of Agricultural UAV on Apron. *Sensors* (Major revision).
12. Guo, Y., D. He\*, L. Chai\*. (2020). A Machine Vision-based Method for Monitoring Scene-interactive Behaviors of the Dairy Calf. *Animals*, 10, 190.
13. Chai, L., H. Xin\*, Y. Wang, J. Oliveira, K. Wang, Y. Zhao. (2019). Mitigating particulate matter emissions of a commercial cage-free aviary hen house. *Transactions of the ASABE*. 62(4): 877-886.
14. Wang, K., K. Liu, H. Xin\*, L. Chai, Y. Wang, T. Fei, J. Oliveira, J. Pan, Y. Ying. (2019). An RFID-Based Automated Individual Perching Monitoring System for Group-House Poultry. *Transactions of the ASABE*, 62(3): 695-704.
15. Oliveira, J., H. Xin\*, L. Chai, S. Millman. (2019). Effects of managing litter floor access and including experienced hens in aviary housing: floor eggs, litter condition, air quality, and hen welfare. *Poultry Science*, 98 (4): 1664–1677.
16. Chai, L\*., and H. Xin\*. (2019). Dust mitigation in winter and heat alleviation in summer
17. with water sprinkling in a cage-free henhouse *Poultry Science,* 98(E-Suppl. 1):161-162.
18. Dowhower, S. L., W. R. Teague, K. D. Casey, and R. Daniel. 2020. Soil greenhouse gas emissions as impacted by soil moisture and temperature under continuous and holistic planned grazing in native tallgrass prairie. *Agriculture Ecosystems & Environment*. 287: 106647. http://dx.doi.org/10.1016/j.agee.2019.106647
19. Parker, D. B., K. D. Casey, H. M. Waldrip, B. R. Min, B. L. Woodbury, M. J. Spiehs, and W. M. Willis. 2019. Nitrous oxide emissions from an open-lot beef cattle feedyard in Texas. *Transactions of the ASABE* 62(5): 1173-1183. http://dx.doi.org/10.13031/trans.13396
20. McDonald, M. D., K. L. Lewis, G. L. Ritchie, P. B. DeLaune, K. D. Casey, and L. C. Slaughter. 2019. Carbon dioxide mitigation potential of conservation agriculture in a semi-arid agriculture region. *AIMS Agriculture and Food*. 4(1): 206-222. http://dx.doi.org/10.3934/agrfood.2019.1.206
21. Sharma, S., N., Rajan, S. Cui, S. J. Maas,K. D. Casey, S. Ale, and R. Jessup. 2019. Carbon and evapotranspiration dynamics of a non-native perennial grass with biofuel potential in the Southern U.S. Great Plains. *Agricultural and Forestry Meteorology*. 269-270: 285-295. http://dx.doi.org/10.1016/j.agrformet.2019.01.037
22. Parker, D. B., B. Meyer, T. Jennings, J. Jennings, N. A. Cole, and K. D. Casey. 2018. Enteric nitrous oxide emissions from beef cattle. *The Professional Animal Scientist* 34(6): 594-607. http://dx.doi.org/10.15232/pas.2018-01769
23. Liu, Z. Things You Should Know Before Disposing Waste Milk. *Texas Animal Manure Management Issues*, <https://tammi.tamu.edu/2020/05/07/things-you-should-know-before-disposing-waste-milk/>. Available online on May 7th 2020.
24. Liu, Z. and X. Wang. Manure Treatment and Utilization in Production Systems. *Animal Agriculture*, *Elsevier*, Academic Press, 2020. 455-467
25. Li, Y., X. Wang, Z. Zhao, S. Han, and Z. Liu. Lagoon Water Quality Monitoring Based on Digital Image Analysis and Machine Learning Estimators. *Water Research*, 2020. 172: 115471.
26. Han, S., S.C. Long, T. Runge, C. Dong, and Z. Liu. Impact of Dairy Manure Processing Using Polyacrylamide on Antibiotic-Resistant Bacterial Level. *Water, Air, & Soil Pollution*, 2019. 230(3): 58.
27. Han, S., Y. Huang, and Z. Liu. Bacterial indicator reduction in dairy manure using hybrid zero-valent iron (h-ZVI) system. *Environmental Science and Pollution Research*, 2019. 26(11): 10790-10799.
28. Liu, Z., J. Howe, X. Wang, X. Liang, and T. Runge. Use of dry dairy manure pellets as nutrient source for tomato (*Solanum Lycopersicum* var. *cerasiforme*) growth in soilless media. *Sustainability*, 2019. 11(3): 811.
29. Mehata, M., Cortus, E. L., Niraula, S., Spiehs, M. J., Darrington, J., Chatterjee, A., . . . Parker, D. (2019). Aerial Nitrogen Losses and Soil Nitrate Balances in Response to Fall-Applied Manure and Fertilizer Applications in Eastern South Dakota. *International Journal of Agronomy* 2019. <https://doi.org/10.1155/2019/8572985>.
30. Ugus, S., Anderson, G., Yang, X., & Simsek, E. Developing photobioreactor (PBR) systems for growing microalgae with air contaminants released from pig confinement buildings. Submitted to *Biosystems Engineering* (under review).
31. Wang, A. H., A. Yang, L. Yan, T.-T. Lim, and W. Wang. 2020. Long-term mesophilic anaerobic co-digestion swine manure with corn stover and microbial community analysis. Microorganisms 8(2):188. https://doi.org/110.3390/microorganisms8020188
32. Nogueira, R. G. S., T.-T. Lim, H. Wang, and P. H. M. Rodrigues. 2019. Performance, microbial community analysis and fertilizer value of anaerobic co-digestion of cattle manure with waste kitchen oil. Applied Engineering in Agriculture, 35(2): 239-248. doi: 10.13031/aea.13023
33. Barzee, T., A. Edalati, H. M. El-Mashad, D. Wang, K. Scow and R. Zhang. 2019. Digestate Biofertilizers Support Similar or Higher Tomato Yields and Quality Than Mineral Fertilizer in a Subsurface Drip Fertigation System. Frontiers in Sustainable Food Systems. 3:58.
34. Miller, C.M.F., H. Waterhouse, T. Harter, J.G. Fadel and D. Meyer. 2020. Quantifying the uncertainty in nitrogen application and groundwater nitrate leaching in manure based cropping systems. Agricultural Systems 184. <https://doi.org/10.1016/j.agsy.2020.102877>
35. Sharara, M., M. Yeboah Owusu Twum, R.A. Larson, & T. Runge. 2020. Planning Methodology for Anaerobic Digestion Systems on Animal Production Facilities under Uncertainty. *Waste Management*, 104:262-269. https://doi.org/10.1016/j.wasman.2020.01.028
36. Tong, X., Zhao, L., Heber, A. J., and Ni, J.-Q. 2020. Mechanistic modelling of ammonia emission from laying hen manure at laboratory scale. Biosystems Engineering, 192, 24-41.
37. Tong, X., Zhao, L., Heber, A. J., and Ni, J.-Q. 2020. Development of a farm-scale, quasi-mechanistic model to estimate ammonia emissions from commercial manure-belt layer houses. Biosystems Engineering, 196, 67-87.
38. Tong, X., S. S. Hong., and L.Y. Zhao**.** CFD modeling of airflow, thermal environment, and ammonia concentration distribution in a commercial manure-belt layer house with mixed ventilation systems. Computers and Electronics in Agriculture. 162:281-299.
39. Tong, X., S. S. Hong., and L.Y. Zhao 2019. Development of upward airflow displacement ventilation system of manure-belt layer houses for improved indoor environment using CFD simulation. Biosystems Engineering. 178:294-308.
40. Tong, X., S. S. Hong., and L.Y. Zhao 2019. CFD modeling of airflow pattern and thermal environment in a commercial manure-belt layer house with tunnel ventilation. Biosystems Engineering. 178:275-293.
41. Knight, R., X. Tong, Z. Liu, S. Hong, and L.Y. Zhao. 2019. Spatial and seasonal variations of PM concentration and size distribution in manure-belt poultry layer houses. Trans. of the ASABE 62(2):415-427. doi: 10.13031/trans.12950
42. Kalus, K., D. Konkol, M. Korczyński, J.A. Koziel, S. Opaliński. Effect of biochar diet supplementation on laying hens performance, manure N content, ammonia, and VOC emissions, egg traits, and egg consumers acceptance. *Agriculture*, 10(6), 237; doi: [10.3390/agriculture10060237](https://doi.org/10.3390/agriculture10060237).
43. Świechowski, K., M. Hnat, P. Stępień, S. Stegenta-Dąbrowska, S. Kugler, JA. Koziel, A. Białowiec. Waste to Energy: Solid Fuel Production from Biogas Plant Digestate and Sewage Sludge by Torrefaction – Process Kinetics, Fuel Properties, and Energy Balance. *Energies*, 13(12), 3161; doi: [10.3390/en13123161](https://doi.org/10.3390/en13123161).
44. Chen, B., J.A. Koziel, C. Banik, H. Ma, M. Lee, J. Wi, Z. Meiirkhanuly, D. Andersen, A. Białowiec, D. Parker. 2020. Emissions from swine manure treated with current products for mitigation of odors and reduction of NH3, H2S, VOC, and GHG emissions. *Data*, 5(2), 54; doi: [10.3390/data5020054](http://dx.doi.org/10.3390/data5020054).
45. Lee, M., P. Li, J.A. Koziel, H-K. Ahn, J. Wi, B. Chen, Z. Meiirkhanuly, C. Banik, W.S. Jenks. 2020. Pilot-scale testing of UV light treatment for mitigation of NH3, H2S, GHGs, VOCs, odor, and O3 inside the poultry barn, *Frontiers in Chemistry*, doi: [10.3389/fchem.2020.00613](https://www.frontiersin.org/articles/10.3389/fchem.2020.00613/abstract).
46. Witkowska, D., M. Korczyński, J.A. Koziel, J. Sowińska, B. Chojnowski. The effect of dairy cattle housing systems on the concentrations of gaseous mixtures in barns determined by Fourier-transform infrared spectroscopy. *Annals of Animal Science*, doi: [10.2478/aoas-2020-0039](https://doi.org/10.2478/aoas-2020-0039).
47. Yang, X., J.A. Koziel, Y. Laor, W. Zhu, J. (Hans) van Leeuwen, W.S. Jenks, S.J. Hoff, J. Zimmerman, S. Zhang, U. Ravid, R. Armon. 2020. VOC Removal from Manure Gaseous Emissions with UV Photolysis and UV-TiO2 Photocatalysis. *Catalysts*, 10(6), 607; doi: [10.3390/catal10060607](https://doi.org/10.3390/catal10060607).
48. Świechowski, K., E. Sygula, J.A. Koziel, P. Stępień, S. Kugler, P. Manczarski, A. Białowiec. 2020. Low-temperature Pyrolysis of Municipal Solid Waste Components and Refuse Derived Fuel – Process Efficiency and Fuel Properties of Carbonized Solid Fuel. *Data*, 5(2), 48; doi: [10.3390/data5020048](https://doi.org/10.3390/data5020048).
49. Orazbayeva, D., J.A. Koziel, M.J. Trujillo-Rodríguez, J.L. Anderson, B. Kenessov. 2020. Polymeric ionic liquids sorbent coatings in headspace solid-phase microextraction: A green sample preparation technique for the determination of pesticides in soil, *Microchemical Journal*, 157, 104996; doi: [10.1016/j.microc.2020.104996](https://doi.org/10.1016/j.microc.2020.104996).
50. Lee, M., J. Wi, J.A. Koziel, H-K. Ahn, P. Li, B. Chen, Z. Meiirkhanuly, C. Banik, W.S. Jenks. 2020. Effects of UV-A light treatment on ammonia, hydrogen sulfide, greenhouse gases, and ozone in simulated poultry barn conditions, *Atmosphere*, 11(3), 283; doi: [10.3390/atmos11030283](https://doi.org/10.3390/atmos11030283).
51. Pulka, J., P. Manczarski, P. Stępień, M. Styczyńska, J.A. Koziel, A. Białowiec. 2020. Waste-to-Carbon: Is the torrefied sewage sludge with high ash content a better fuel or fertilizer? *Materials*, 13(4), 954; doi: [10.3390/ma13040954](https://doi.org/10.3390/ma13040954).
52. Stępień, P., K. Świechowski, M. Hnat, S. Kugler, S. Stegenta-Dąbrowska, J.A. Koziel, P. Manczarski, A. Białowiec. 2019. Waste to Carbon: biochar from elephant dung as new cooking fuel. *Energies*, 12(22), 4344; doi: [10.3390/en12224344](https://doi.org/10.3390/en12224344).
53. Stegenta -Dąbrowska, S, G. Drabczyński, K. Sobieraj, J.A. Koziel, A. Białowiec. 2019. The biotic and abiotic carbon monoxide formation during aerobic co-digestion of dairy manure with green waste and sawdust. *Frontiers in Bioengineering and Biotechnology,* 7:283; doi: [10.3389/fbioe.2019.00283](https://doi.org/10.3389/fbioe.2019.00283).
54. Stępień, P., M. Serowik, J.A.Koziel, A. Białowiec. 2019. Waste to carbon: estimating the demand for production of carbonized refuse-derived fuel, *Sustainability*, 11(20), 5685; doi: [10.3390/su11205685](https://doi.org/10.3390/su11205685).
55. Świechowski, K., S. Stegenta- Dąbrowska, M. Liszewski, P. Bąbelewski, J.A. Koziel, A. Białowiec. 2019. Oxytree pruned biomass torrefaction: process kinetics. *Materials*, 12(20), 3334; doi: [10.3390/ma12203334](https://doi.org/10.3390/ma12203334).
56. Stępień, P., C. Banik, J.A. Koziel, A. Białowiec. 2019. Emission of volatile organic compounds from a carbonized refuse-derived fuel (Emisja lotnych związków organicznych z karbonizowanego paliwa z odpadow). *Przemysł Chemiczny*, 98(9), 1445-1447. doi: [10.15199/62.2019.9.21](https://doi.org/10.15199/62.2019.9.21)
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60. Maurer, D., C. Ellis, T. Thacker, S. Rice, J.A. Koziel, K.C. VerCauteren, P. Nol. 2019. Screening of microbial volatile organic compounds for detection of disease in cattle: development of lab-scale method. *Scientific Reports*, 9:12103; doi: [10.1038/s41598-019-47907-w](https://doi.org/10.1038/s41598-019-47907-w).
61. Syguła, E., J.A. Koziel, A. Białowiec. Proof-of-the-concept of spent mushroom compost torrefaction –studying the process kinetics and the influence of temperature and duration on the calorific value of the produced biocoal. *Energies*, 12(16), 3060; doi: [10.3390/en12163060](https://doi.org/10.3390/en12163060).
62. Świechowski, K., M. Liszewski, P. Bąbelewski, J.A. Koziel, A. Białowiec. 2019. Oxytree pruned biomass torrefaction: mathematical models of the influence of temperature and residence time on fuel properties improvement. *Materials*, 12(14), 2228; doi: [10.3390/ma12142228](https://doi.org/10.3390/ma12142228).
63. Dougherty, B., Pederson, C.H., Mallarion, A.P., Andersen, D.S., Soupier, M.L., & Hemlers, M.J. (2020) Midwestern cropping system effects on drainage water quality and crop yields. *Jouranl of Environmental Quality* 49(1): 38-49.
64. Trabue, S., B.J. Kerr, D.S. Andersen. (2019) Impact of carbohydrate source on manure and air emissions from swine diets. Journal of Animal Science 97: 388-389.
65. Smith, B., Hoff, S., Harmon, J., Andersen, D. Zimmerman, J., Stinn, J. (2019) Quantification of site layout and filter characteristics on primary filter airflow reduction on commercial swine sites in Iowa. *AgriEngineering* 1(2): 291-302.
66. Rodríguez, L., A.-M. Marshall, D. Cotton, R. Koelsch, J.A. Koziel, D. Meyer, D. Steward, J. Heemstra, A. Padmanabahn, J. Classen, N.J. Meyer, B. Ruddell, S.M. Ryan, X. Cai, E. Habib, P.D. Saundry. 2019. The development of the INFEWS-ER: a virtual resource center for transdisciplinary graduate student training at the nexus of food, energy, and water. *Frontiers in Environmental Science*, 7, 38; doi: [10.3389/fenvs.2019.00038](https://www.frontiersin.org/articles/10.3389/fenvs.2019.00038/abstract).

### Conference Proceedings

1. Zhu, J., S. Wu, J. Shen. 2019. Anaerobic co-digestion of poultry litter and wheat straw affected by solids, free ammonia, and carbon/nitrogen ratio with response surface analysis. ASABE Annual International Meeting paper#: 1900026. Boston, MA. July 7-10, 2019.
2. Zhu, J. 2019. Bioconverting the nutrients of animal manure, technology and experience in US. Keynote Speech invited by the Chinese Society of Animal Husbandry at the 3rd China Swine Science Conference. Sept. 19-21, 2019 in Qingdao, China.
3. Ajayi-Banji, A., and S. Rahman. 2019. Effect of NaOH-pretreated-corn stover and dairy manure on biogas production in solid-state anaerobic co-digestion. 2019 ASABE Annual International Meeting, Boston, MA, July 7-10, 2019.
4. Rahman, S. W., and S. Rahman. 2019. Characterization of biochar from different feedstocks under low and high temperature. 2019 ASABE Annual International Meeting, Boston, MA, July 7-10, 2019.
5. Ajayi-Banji, A., and S. Rahman. 2019. Effect of pretreatment and agitation frequency on methane yield in solid-state anaerobic co-digestion of dairy manure and corn stover. 2019 Waste to Worth Conference, Minneapolis, Minnesota, April 22-26, 2019.
6. Ajayi-Banji, A., and S. Rahman. 2019. Synergetic process parameters interaction in solid-state anaerobic co-digestion. 2019 Waste to Worth Conference, Minneapolis, Minnesota, April 22-26, 2019.
7. 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. 2020 Poultry Science Association Meeting Paper (accepted).
8. Chai, L, Y. Zhao, B. Richardson, H. Xin. 2019. Disinfecting egg pallet and flat with heat treatment at the farm gate of the USA. 2019 International Symposium on Animal Environment and Welfare. October 21–24, 2019 Chongqing, China. Proceedings p3-10.
9. Chai, L, and H. Xin. Dust mitigation in winter and heat alleviation in summer with water sprinkling in a cage-free henhouse. PSA 19 Annual Meeting, July 15-18, 2019, Montreal, Canada. (Presentation).
10. Chai, L, C. Dunkley., C. W. Ritz. 2019. Monitoring the winter ammonia and dust level in a broiler breeder house of the Southeastern US. 2019 ASABE International Meeting, July 7-10, 2019, Boston, MA (Presentation).
11. Rajan, N., W. L. Rooney, S, Okumoto, R. W. Schnell, M. Bagavathiannan, J. Aitkenhead-Peterson, J. Jifon, K. Chu, K. D. Casey and G. V. Subbarao. 2019. Climate smart agriculture: The role of biological nitrification inhibition. In: Proc of the *ASA, CSSA and SSSA International Annual Meetings*, Nov 11-13. 2019, San Antonio, TX. [Abstract & Oral Presentation]
12. Zapata, D., N. Rajan, K. Casey, J. E. Mowrer, and R. W. Schnell. 2019. Linking carbon dioxide and nitrous oxide emissions from crop residue decomposition. 2019 In: Proc of the *ASA, CSSA and SSSA International Annual Meetings*, Nov 11-13. 2019, San Antonio, TX. [Abstract & Poster Presentation]
13. Casey, K. D., D. B. Parker, and H. M. Waldrip. 2019. The impact of dry surface layer depth on nitrous oxide flux from feedyard pens surfaces. In: Proc of the *ASA, CSSA and SSSA International Annual Meetings*, Nov 11-13. 2019, San Antonio, TX. [Abstract & Oral Presentation]
14. Zapata, D., N. Rajan, and K. D. Casey. 2019. An investigation of chamber closing times for measuring greenhouse gas fluxes from agricultural soils using automated chambers. In: Proc of *the ASA, CSSA and SSSA International Annual Meetings*, Nov 11-13. 2019, San Antonio, TX. [Abstract & Oral Presentation]
15. Zapata, D., N. Rajan, J. Moreno, R. W. Schnell, S. Nair, and K. D. Casey. 2019. Transitioning into organic grain production in Texas: Challenges and environmental impact. In: Proc of the *ASA, CSSA and SSSA International Annual Meetings*, Nov 11-13. 2019, San Antonio, TX. [Abstract & Oral Presentation]
16. Holbert, A. S. Murray, K. Norman, S. Lawhon, J. Sawyer, J. Vinasco, H. M. Scott, B. Auvermann, J. Jennings, and K. Casey, W. Pinchak. 2019. The effect of tylosin and DFM supplementation on Enterococcus and antibiotic resistance in the cattle feedyard. In: Proc of the *Conference of Research Workers in Animal Diseases,* Nov 2-5, 2019, Chicago, IL. [Abstract & Oral]
17. Leon, I. M. H. M. Scott. B. Auvermann, K. Casey, J. Jennings, W. Pinchak, J. Vinasco, S. Lawhon, and K. N. Norman. 2019. Presence and characteristics of antimicrobial resistant determinants in viable bacteria from cattle feedyard dust.In: *Proc of the Conference of Research Workers in Animal Diseases.* Nov 2-5, 2019, Chicago, IL. [Abstract & Poster]
18. Rajan, N., W. Rooney, S. Okumoto, R. Schnell, M. Bagavathiannan, J. A. Aitkenhead-Peterson, K. Chu, K. Casey, J. Jifon, G. V. Subbarao. 2019. Climate-smart Farming with Low-nitrifying Agricultural Systems. In: Proc of the *AGU Fall Meeting*, Dec 9-13. 2019, San Francisco, CA.
19. Casey, K. D., D. B. Parker, H. M. Waldrip, B. L. Woodbury and M. J. Spiehs. 2019. Greenhouse gas emissions from pen surfaces at a Texas High Plains beef cattle feedyard. In: *Proc of the 7th Greenhouse Gas and Animal Agriculture Conference*, Aug 04-10. 2019, Foz do Iguassu, PR, Brazil. [Abstract & Poster]
20. Casey, K. D., D. B. Parker, H. M. Waldrip, B. L. Woodbury and M. J. Spiehs. 2019. Diurnal measurements of methane emissions from a feedyard pen surface during spring and summer in Texas. ASABE Paper 1900888. St. Joseph, MI: ASABE. [Abstract & Paper]
21. Parker, D. B., K. D. Casey, E. L. Cortus, B. R. Min, H. M. Waldrip, B. L. Woodbury and M. J. Spiehs. 2019. Empirical Model of Annual Nitrous Oxide Emissions from Open-Lot Beef Cattle Feedyard Pens (Version 2). ASABE Paper 1900299. St. Joseph, MI: ASABE. [Abstract & Paper]
22. Casey, K., D. Parker, H. Waldrip, M. Spiehs, and B. Woodbury. 2018. Diurnal measurements of methane emissions from a feedyard pen surface in Texas during spring. In: *Proc of the ASA and CSSA International Annual Meetings*, Nov 5-7. 2018, Tampa, FL. [Abstract & Oral Presentation]
23. Waldrip, H., D. Parker, D. Miller, K. Casey, L. Durso, and R. Todd. 2018. Nitrous oxide from beef cattle feedyards: Understanding effects of microbial community structure, climate and manure properties. In: *Proc of the ASA and CSSA International Annual Meetings*, Nov 5-7. 2018, Tampa, FL. [Abstract & Poster]
24. Zapata, D., N. Rajan, K. Casey, and R. Schnell. 2018. Carbon and nitrogen mineralization of cereal and legume cover crop residues in organic soils. In: *Proc of the ASA and CSSA International Annual Meetings*, Nov 5-7. 2018, Tampa, FL. [Abstract & Poster]
25. Liu, Z. and S. Han. Synergistic Effect of Cationic Polymer with Hydrogel on Bacterial Reduction in Water Systems. 2019. *ASABE Annual International Meeting,* Boston, MA
26. Adhikari, U., Safferman, S., Barrott, W., Busch, A. 2019. Use of Decision-Making Tools and Biochemical Methane Potential Assays to Select Feedstocks for Co-digestion with Biosolids. WEFTEC 2019, Chicago, IL, September 23, 2019, pp. 384-354.
27. Safferman, S. I., Smith, J. S., Crow, R. L. 2019. Winter Manure Application: Research Needs and Future Direction. Waste to Worth, Minneapolis, MN, April 24, 2019.
28. Safferman, S. I., Smith, J. S., Crow, R. L. 2019. Macropore Characterization to Enable the Selection of Practices that Minimize Soluble Phosphorus Loss. Waste to Worth, Minneapolis, MN, April 24, 2019.
29. Lim, T.-T., C. B. Bromfield, C. Payne, L. Delaney, R. E. Massey, and J. A. Zulovich. 2019. Recommendations for effective biosecurity management. In International Symposium on Animal Environment and Welfare. Rongchang, Chongqing, China.
30. Massey, R. E., T.-T. Lim, and J. A. Zulovich. 2019. Economic conditions for implementing solid-liquid separation barn. In International Symposium on Animal Environment and Welfare. Rongchang, Chongqing, China.
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### Thesis/Dissertations

1. Ademola Ajayi-Banji. 2019. Optimization of methane yield in solid-state anaerobic co-digestion of dairy manure and corn stover. Ph.D. Dissertation, North Dakota State University.
2. Zapata Rojas, D. 2019. Impact of cropping practices and tillage on greenhouse gas emissions in Southcentral Texas. (Ph.D. dissertation). Texas A&M University. [Committee Member]
3. McDonald M. D. 2018. Impact of Conservation Management Practices on Greenhouse Gas Emission in Semi-Arid, Intensively Cropped Regions of Texas (M.S. Thesis). Texas Tech University. [Committee Member]
4. Tong, X. 2019. Ph.D. dissertation “Modeling of Indoor Environment and Ammonia Emissions, Distribution, and Dispersion Within and From Manure-Belt Layer Houses”, The Ohio State University, April 19, 2019.
5. Zhanibek Meiirkhanuly. Evaluation of Biochar for Mitigation of Ammonia, Hydrogen Sulfide, Odorous Volatile Organic Compounds, and Greenhouse Gases Emissions from Swine Manure 2019. Master’s Thesis, Iowa State University, Ames, IA, USA, July 2019.
6. Baitong Chen. Evaluating the Effectiveness of Manure Ddditives on Mitigation of Gaseous Emissions from Deep Pit Swine Manure. Master’s Thesis, Iowa State University, Ames, IA, USA, 2019. Department of Agricultural and Biosystems Engineering.

### Extension and Outreach

1. Chai, L and C. Ritz. 2020. Dust suppression in poultry houses. *Bulletin*. UGA Poultry Extension (under review).
2. Chai, L. 2019. Suppressing dust in cage-free henhouse with the sprinkling system. *Poultry Tips*. UGA Poultry Extension.
3. Chai, L. 2019. Layer House Water System Design. Georgia Layer Conference. Gainesville, GA. September 23, 2019. (Extension training/50 attendees)
4. Chai, L. 2019. Cage-free Environmental Management in the USA. September 4, 2019, Hefei, China (Invited by Anhui Academy of Agricultural Science, China).
5. Chai, L. 2019. Layer House Air Quality Management. 2019 International Poultry Short Course (100 national/international poultry farm managers) in Watkinsville, GA (February 5-8, 2019). (Extension Training Talk, 100 attendees).
6. Liu, Z. Manure Management and Utilization. 11/11/2019. *Southwest Dairy Day*, Snyder, TX
7. Sabo, R. (Presenter), Sharara, M. (Presenter), Cortus, E. L. (Moderator). "Watershed Nutrient Inventories – Opportunities and Needs", Livestock and Poultry Environmental Learning Community and S1074. (Sept 20, 2019).
8. South Dakota Odor Footprint Tool (SDOFT), Part 1: Principles and Tool Formulation. South Dakota State University Extension.
9. South Dakota Odor Footprint Too (SDOFT), Part 2: Examples. South Dakota State University Extension.
10. Rogers, E., Fronczak, S., Tirrell, B., Safferman, S., Dong, Y, Bradford, B., Kirk, D., Harrigan, T. 2020. Supply chain Disruptions in the Dairy Industry How do I Manage Excess Raw Milk on My Farm from an Agronomic and Environmental Perspective? Michigan State University Extension. 4/24/2020. https://www.canr.msu.edu/resources/supply-chain-disruptions-in-the-dairy-industry.
11. Safferman, S. 2019. Agriculture Best Management Practices: Technologies and Challenges. Stormwater Seminar XVIII, Piqua, OH, March 12, 2019.
12. Seamon, M., Gower, S. B., Safferman, S. 2019. Soybean Research Updates: Plant Populations, Varieties and Soil Drainage. 2010 Great Lakes Crop Summit, Mt. Pleasant, MI. January 30, 2019.
13. Koelsch, Richard, Daniel Andersen, Erin Cortus, Leslie Johnson, Amy M. Schmidt, Melissa Wilson. 2020. Value of Manure Library for Educators and Advisors. Livestock and Poultry Environmental Learning Community web product. <https://lpelc.org/value-of-manure-library/>
14. Zhao. L.Y. 2020. Challenges threatening sustainable egg production in the United States. Ohio’s Country Journal. Jan. 2020, Page 21 and 31.
15. Tong, X. and L.Y. Zhao. 2019. Improving air conditions in poultry layer houses. Ohio’s Country Journal. Jan. 2019, Page 22-23.
16. 2019 – Keynote Lecture. Koziel, J.A. Solving livestock odor problem and improving indoor air quality – an American perspective. *XIX International Congress of ISAH (International Society for Animal Hygiene) 2019*, Wroclaw, Poland, September 2019.
17. Koziel, J.A. Internationalization, social media, and transdisciplinarity: key elements of Academia development recipe. Wroclaw, Poland, November 2019.
18. Koziel, J.A. Can odor be a killer? Wroclaw University of Environmental and Life Sciences, Wroclaw, Poland, November 2019.
19. Koziel, J.A. The conceptualization of scientific research - why, what, and how it is really important. Wroclaw University of Environmental and Life Sciences, Wroclaw, Poland, November 2019.
20. Koziel, J.A. Workshop on writing scientific papers in Environmental Engineering. Wroclaw University of Environmental and Life Sciences, Wroclaw, Poland, November 2019.
21. Koziel, J.A. Publishing options for research data. Wroclaw University of Environmental and Life Sciences, Wroclaw, Poland, September 2019.
22. Koziel, J.A., B. Ramirez. Review of carcass disposal options for mass mortality. ISU McKean Swine Disease Conference, Ames, IA, November 2019.
23. *ASABE Resource Magazine*. Research featured “[New screening tool developed by Iowa State University researchers can speed detection of bovine tuberculosis](https://www.asabe.org/Portals/0/aPubs/Resource/PDF/Resource27-01JanFeb2020.pdf)”. Jan 2020.
24. *Wisconsin Public Radio*. Research featured in article: “[WisContext: Whose Manure Smells Worse: Cows, Pigs Or Poultry? The Complex Chemistry Of Assessing Animal Waste Odors](https://www.wpr.org/wiscontext-whose-manure-smells-worse-cows-pigs-or-poultry)”. Nov 2019.
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26. *Wisconsin Public Radio*. Research featured in article: “[WisContext: How To Smell A CAFO: The Science of Odor and its Role in Wisconsin's Rules for Large Livestock](https://www.wpr.org/wiscontext-how-smell-cafo)”. Oct 2019.
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32. *U.S. Poultry and Egg Association.* Press Release “[Research Provides Insight on How to Improve Indoor Air Quality in Poultry Housing with Black UV Light](http://www.uspoultry.org/mediacenter/docs/2019-USPOULTRYAnnouncesResearchResult-F080.pdf)”. Oct 2019.
33. *AgUpdate.com*. Impact statement “[Bovine tuberculosis-screening tool developed](https://www.agupdate.com/agriview/briefs/dairy/bovine-tuberculosis-screening-tool-developed/article_19c9e28a-ee48-556f-bffe-bafd89fe9b9a.html)”. Oct 2019.
34. *Land-Grant Impacts*. Impact statement “[Iowa State Researchers Develop New Screening Tool That Can Speed Detection of Bovine Tuberculosis](https://landgrantimpacts.tamu.edu/impacts/search)”. Oct 2019.
35. *High Plains Journal*. Research featured in article “[New screening tool developed by Iowa State University researchers can speed detection of bovine tuberculosis](https://www.hpj.com/livestock/new-screening-tool-developed-by-iowa-state-university-researchers-can/article_995b9fc0-e230-5462-9dfc-b6083f04578a.html)”, Oct 2019.
36. *Morning Ag Clips*. Research featured in article “[Screening tool can speed detection of bovine TB](https://www.morningagclips.com/screening-tool-can-speed-detection-of-bovine-tb/)”, Sep 2019.
37. *Feedstuffs.com.* News article “[New screening tool may speed bovine TB detection](https://www.feedstuffs.com/nutrition-health/new-screening-tool-may-speed-bovine-tb-detection)”, Sep 2019.
38. *ISU College of Agriculture and Life Sciences News.* News article “[New Screening Tool Developed by Iowa State University Researchers Can Speed Detection of Bovine Tuberculosis](https://www.cals.iastate.edu/news/releases/new-screening-tool-developed-iowa-state-university-researchers-can-speed-detection)”, Sep 2019.
39. *ISU College of Agriculture and Life Sciences News.* News article “[ABE’s Koziel Honored for Peer Review Excellence](https://www.cals.iastate.edu/news/agonline/issue/1073)”, Sep 2019.
40. *ISU College of Engineering News.* News article “[International exchange: Jacek Koziel on his Uzbekistan Fulbright Specialist experience](https://news.engineering.iastate.edu/2019/08/13/international-exchange-jacek-koziel-on-his-uzbekistan-fulbright-specialist-experience/)”, Aug 2019.
41. Commercial Manure Applicator Certification for Iowa Manure Haulours
42. Newsletter articles on nutrient and carbon management were disseminated through the California Dairy Quality Assurance Program newsletter and the University of California Cooperative Extension Dairy newsletter.
43. Disseminated tips for bulk milk disposal.

### Other

1. Milk Disposal Estimator Online Tool, <https://tammi.tamu.edu/milk-project/>, Available online on May 7th 2020.
2. Koelsch, Richard. 2019. INFEWS-ER High Performing Teams. Four hour Moodle learning module addressing development of high performing teams among trans-disciplinary work groups. Housed in Learn@Illinois, a protected University of Illinois content management host site.
3. Meyer, D., R. Koelsch. 2019. INFEWS-ER Dairy Carbon Cohort Challenge. Twenty hour Moodle learning module addressing management of carbon in dairy farms. Housed in Learn@Illinois, a protected University of Illinois content management host site.
4. Meyer, D., R. Koelsch. 2020. INFEWS-ER Dairy Nitrogen Cohort Challenge. Twenty hour Moodle learning module addressing management of nitrogen in dairy farms. Housed in Learn@Illinois, a protected University of Illinois content management host site.
5. Information on managing nutrient imbalance shared with CA stakeholders through the Research Advisory Committee for the California Dairy Research Foundation, biweekly calls with Central Valley Regional Water Quality Control Board staff, and managers of the Central Valley Dairy Representative Monitoring Program.
6. Meyer, D. 2020. Use the four 4’s to guide your application strategy. Journal of Nutrient Management Feb: 22-23.
7. Several Toolbox Modules are ready for consumption and incorporation into related learning opportunities. They are available via the INFEWS-ER resources posted at Learn@Illinois:
8. Building and Utilizing Personal Knowledge Networks
9. High Performing Teams
10. Stakeholder Analysis
11. Over the past year we have initiated work on an NSF Funded Project which leverages this award greatly: Belmont Forum Collaborative Research Food-Water-Energy Nexus: Intelligent Urban Metabolic Systems for Green Cities of Tomorrow: an FWE Nexus-based Approach. (NSF Award # 1833225)