

# Chaoyu Zhai, Ph.D.

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## **EDUCATION**

### **Doctor of Philosophy (2018 – 2022)**

Animal Sciences, Colorado State University

Advisor: Dr. Mahesh N. Nair

Committee members: Drs. Keith E. Belk, Jessica E. Prenni, Adam J. Chicco, and Mahesh N. Nair

### **Master of Science (2018)**

Agricultural Product Processing & Storage Engineering, Shandong Agricultural University, China

Advisors: Dr. Xin Luo and Dr. Surendranath P. Suman

### **Bachelor of Engineering (2015)**

Food Science & Engineering, Shandong Agricultural University, China

## **PROFESSIONAL EXPERIENCE**

### **Academic Positions**

- **Assistant Professor** (10/2022 – Present), Department of Animal Science, University of Connecticut, CT
- **Graduate Research Assistant** (07/2018 – 09/2022), Department of Animal Sciences, Colorado State University, CO
- **Visiting Research Scholar** (09/2016 – 10/2017), Department of Animal and Food Sciences, University of Kentucky, KY
- **Graduate Research and Teaching Assistant** (07/2015 – 06/2018), College of Food Science and Engineering, Shandong Agricultural University, China
- **Undergraduate Research Assistant** (09/2013 – 06/2015), College of Food Science and Engineering, Shandong Agricultural University, China

### **Professional Affiliations**

- American Meat Science Association
- American Society of Animal Science
- Institute of Food Technologists
- American Chemical Society
- Poultry Science Association
- American Poultry Association

## **AWARDS/CERTIFICATIONS**

- Ph.D. Division of Research Poster Competition, Second Place, American Meat Science Association Annual Reciprocal Meat Conference (2022)
- National Western Stock Show Graduate Scholarship, Colorado State University (2021)
- Graduate Certificate in Data Analysis, Department of Statistics, Colorado State University (2019)

- Graduate Academic Scholarship, Shandong Agricultural University, China (2015 – 2017)
- Outstanding Graduate, Shandong Province, China (2015)
- Student Government Association Leadership Awards, Shandong Province, China (2014)
- Undergraduate Leadership Awards, Shandong Agricultural University, China (2013)
- Undergraduate Merit Scholarship, Shandong Agricultural University, China (2012 – 2014)
- Undergraduate Academic Scholarship, Shandong Agricultural University, China (2012)

## **RESEARCH**

### **Research Projects**

1. Effect of nicotinamide riboside supplementation on postmortem mitochondria functionality and apoptotic activation (2021 – Present)
2. Tandem mass tag labeling and gas chromatography-mass spectrometry to identify proteome and metabolome variation among pork longissimus with differing tenderness, color, and water holding capacity (2021 – Present)
3. Effect of lipid oxidation products on enzyme systems involved in meat color stability and tenderization (2019 – Present)
4. Validating the ability of rapid evaporative ionization mass spectrometry to differentiate lamb and beef flavor performance based on consumer preference (2020 – 2021)
5. Consumer sensory evaluation of lamb from different production systems (2020 – 2021)
6. Effect of pulmonary arterial pressure in fattened Angus steers on early postmortem mitochondria functionality and meat quality (2019 – 2021)
7. Tandem mass tag labeling to identify muscle-specific proteome changes in beef during early postmortem period (2019 – 2020)
8. Evaluation of the effects of breed on shear force, sensory attributes, and fatty acid profile of longissimus steaks from crossbred wagyu (2019)
9. Early-postmortem metabolic comparison among three extreme acute heat stress temperature settings in chicken breast muscle (2018 – 2019)
10. Vitamin E and ractopamine supplementation induced remodeling in the mitochondrial proteome of postmortem muscle (2016 – 2018)

### **Peer-Reviewed Journal Articles**

1. **Zhai, C.**, Schilling, B., Prenni, J. E., Brooks, J. C., Legako, J. F., Miller, R. K., Hernandez-Sintharakao, M. J., Gifford, C. L., Delmore, R., & Nair, M. N. (2022). Evaluating the ability of rapid evaporative ionization mass spectrometry to differentiate beef palatability based on consumer preference. *Journal of Food Science and Technology*, Accepted.
2. **Zhai, C.**, Li Puma, L. C., Chicco, A. J., Omar, A., Delmore, R. J., Geornaras, I., Speidel, S. E., Holt, T. N., Thomas, M. G., Enns, R. M., & Nair, M. N. (2022). Pulmonary arterial pressure in fattened Angus steers at moderate altitude influences early postmortem mitochondria functionality and meat color during retail display. *Journal of Animal Science*, 100(2), 1-9. DOI: 10.1093/jas/skac002.
3. **Zhai, C.**, Huff-Lonergan, E., Lonergan, S. M., & Nair, M. N. (2022). Housekeeping proteins in meat quality research: Are they reliable markers for internal controls in western blot? - A mini-review. *Meat and Muscle Biology*, 6(1), 1-15. DOI: 10.22175/mmb.11551.
4. **Zhai, C.**, Suman S. P., Li, S., Nair, M. N., Beach, C. M., Edenburn, B. M., Boler, D. D., Dilger, A. C., & Felix, T. L. (2022). Ractopamine-induced remodeling in the mitochondrial proteome of postmortem longissimus lumborum muscle from feedlot steers. *Livestock Science*, 260, 104923. DOI: 10.1016/j.livsci.2022.104923.

5. Zhang, M., Zhai, C. (co-first author), Luo, X., Lin, H., Zhang, M, Zhu, L., Nair, M. N., Ahn, D. U., & Liang, R. (2021). An early-postmortem metabolic comparison among three extreme acute heat stress temperature settings in chicken breast muscle. *Journal of Food Science and Technology*, *14*, 1-7. DOI: 10.1007/s13197-021-05230-1.
6. **Zhai, C.**, Djimsa, B. A., Prenni, J. E., Woerner, D. R., Belk, K. E., & Nair, M. N. (2020). Tandem mass tag labeling to characterize muscle-specific proteome changes in beef during early postmortem period. *Journal of Proteomics*, 103794. DOI: 10.1016/j.jprot.2020.103794.
7. **Zhai, C.**, Djimsa, B. A., Brown, K., Prenni, J. E., Woerner, D. R., Belk, K. E., & Nair, M. N. (2020). Tandem mass tagged dataset used to characterize muscle-specific proteome changes in beef during early postmortem period. *Data in Brief*, *32*, 106064. DOI: 10.1016/j.dib.2020.106064.
8. **Zhai, C.**, Peckham, K., Belk, K. E., Ramanathan, R., & Nair, M. N. (2019). Carbon chain length of lipid oxidation products influence lactate dehydrogenase and NADH-dependent metmyoglobin reductase activity. *Journal of Agricultural and Food Chemistry*, *67*(48), 13327–13332. DOI: 10.1021/acs.jafc.9b05634.
9. **Zhai, C.**, Suman, S. P., Nair, M. N., Li, S., Luo, X., Beach, C. M., Harsh, B. N., Boler, D. D., Dilger, A. C., & Shike, D. W. (2018). Supranutritional supplementation of vitamin E influences mitochondrial proteome profile of post-mortem longissimus lumborum from feedlot heifers. *South African Journal of Animal Science*, *48*(6), 1140–1147. DOI: 10.4314/sajas.v48i6.18.
10. Dang, D. S., **Zhai, C.**, Nair, M. N, Thornton, K. J., & Matarneh S. K. (2022). Tandem mass tag labeling to assess proteome differences in beef steaks varying in tenderness. *Journal of Animal Science*, *100*(8), 1-13. DOI: 10.1093/jas/skac042.
11. Kim, H. M., Suman, S. P., Wang, Y., Li, S., Beach, C. M., Nair, M. N., **Zhai, C.**, Harsh, B. N., Boler, D. D., Dilger, A. C., & Shike D. W. (2021). Vitamin E supplementation influences proteome profile of postmortem beef longissimus lumborum muscle. *Fleischwirtschaft International*, 4/2021. E-paper: [https://english.fleischwirtschaft.de/service/epaper-FLEISCHWIRTSCHAFT-international-4\\_2021](https://english.fleischwirtschaft.de/service/epaper-FLEISCHWIRTSCHAFT-international-4_2021).
12. Kim, H. M., Suman, S. P., Li, S., Beach, C. M., Nair, M. N., **Zhai, C.**, Edenburn, B. M., Felix, T. L., Dilger, A. C., & Boler, D. D. (2019). Ractopamine-induced changes in the proteome of post-mortem beef longissimus lumborum muscle. *South African Journal of Animal Science*, *49*(3), 424. DOI: 10.4314/sajas.v49i3.3.

### Book Chapter

1. Nair, M. N., & **Zhai, C.** (2020). Chapter 19—Application of proteomic tools in meat quality evaluation. In A. K. Biswas & P. K. Mandal (Eds.), *Meat Quality Analysis* (pp. 353–368). Academic Press.

### Industry Report

1. **Zhai, C.**, Thompson, T. W., Guimaraes, O., Delmore, R. J., & Nair, M. N. An evaluation of the effects of breed on shear force, sensory attributes, and fatty acid profile of longissimus steaks from crossbred wagyu.

### Conference Abstracts

1. **Zhai, C.**, Hernandez-Sintharakao, M. J., Rice, E. A., Thompson, T. W., Bechtold, E. R., Prenni, J. E., Woerner, D. R., & Nair, M. N. Comparison of two types of electrodes used in rapid evaporative ionization mass spectrometry on the ability to differentiate lamb flavor performance. American Meat Science Association Annual Reciprocal Meat Conference, Jun 12-15, 2022, Des Moines, IA, Abstract # 93.
2. **Zhai, C.**, Lonergan, S. M., Huff-Lonergan, E., Johnson, L. G., Steadham, E. M., Brown, K., Prenni, J. E., & Nair, M. N. Lipid peroxidation products influence calpain-1 activity and autolysis in vitro.

- American Meat Science Association Annual Reciprocal Meat Conference, Jun 12-15, 2022, Des Moines, IA, Abstract # 166.
3. **Zhai, C.**, Whitcomb, L. A., Chicco, A. J., Gravely, M. E., Alcocer, H. M., Alambarrio, D. J., Gonzalez, J. M., & Nair, M. N. Effect of nicotinamide riboside dietary supplementation on early postmortem mitochondria functionality in pork longissimus dorsi muscle. American Meat Science Association Annual Reciprocal Meat Conference, Jun 12-15, 2022, Des Moines, IA, Abstract # 167.
  4. **Zhai, C.**, Lonergan, S. M., Huff-Lonergan, E., Johnson, L. G., Steadham, E. M., Chaparro, J. M., Reeve, L. M., Prusa, K. J., Prenni, J. E., Nair, M. N. Tandem mass tag labeling and gas chromatography-mass spectrometry to identify soluble proteome and metabolome variation among pork longissimus with differing instrumental color. American Meat Science Association Annual Reciprocal Meat Conference, Jun 12-15, 2022, Des Moines, IA, Abstract # 168.
  5. Lonergan, S., Huff Lonergan, E., Johnson, L. G., **Zhai, C.**, Steadham, E., Prusa, K. J., Reeve, L., Chaparro, J. M., Prenni, J. E., Nair, M. N. Distinct proteomic and metabolomic profiles are associated with the instrumental texture of aged pork loin. American Meat Science Association Annual Reciprocal Meat Conference, Jun 12-15, 2022, Des Moines, IA, Abstract # 160.
  6. Johnson, L. G., **Zhai, C.**, Reeve, L., Steadham, E. M., Prusa, K. J., Nair, M. N., Huff-Lonergan, E., Lonergan, S. M. Characterizing the proteome of aged pork loins classified by purge loss. American Meat Science Association Annual Reciprocal Meat Conference, Jun 12-15, 2022, Des Moines, IA, Abstract # 162.
  7. Johnson, L. G., **Zhai, C.**, Steadham, E. M., Nair, M. N., Huff-Lonergan, E., Lonergan, S. M. Exposure of calpain-2 to different lipid oxidation products affects activity and autolysis. American Meat Science Association Annual Reciprocal Meat Conference, Jun 12-15, 2022, Des Moines, IA, Abstract # 163.
  8. **Zhai, C.**, Li Puma, L. C., Chicco, A. J., Omar, A., Delmore, R. J., Geornaras, I., Speidel, S. E., Holt, T. N., Thomas, M. G., Enns, R. M., & Nair, M. N. High pulmonary arterial pressure in steers at moderate altitude affects early postmortem mitochondria functionality. Annual Reciprocal Meat Conference, August 15-18, 2021, Reno, NV, Abstract # 123.
  9. **Zhai, C.**, Delmore, R. J., Geornaras, I., Speidel, S. E., Holt, T. N., Thomas, M. G., Enns, R. M., & Nair, M. N. Pulmonary arterial pressure in cattle influences beef color during retail display. American Society of Animal Science Annual 2020 Meeting.
  10. **Zhai, C.**, Suman S. P., Li, S., Nair, M. N., Beach, C. M., Edenburn, B. M., Boler, D. D., Dilger, A. C., & Felix, T. L. Ractopamine-induced changes in the mitochondrial proteome of postmortem beef longissimus lumborum. Annual Reciprocal Meat Conference, June 23-26, 2019, Fort Collins, CO, Abstract # 139.
  11. **Zhai, C.**, Djimsa, B. A., Prenni, J. E., Delmore, R. J., Woerner, D. R., Belk, K. E., & Nair, M. N. Tandem mass tag labeling to identify proteome changes in beef longissimus lumborum and psoas major muscles during early postmortem period. Annual Reciprocal Meat Conference, June 23-26, 2019, Fort Collins, CO, Abstract # 153.
  12. Kim, H. M., Suman, S. P., Li, S., Beach, C. M., **Zhai, C.**, Nair, M. N., Harsh, B. N., Boler, D. D., Dilger, A. C., & Shike, A. C. Supranutritional supplementation of vitamin E influences the abundance of antioxidant proteins in postmortem longissimus lumborum from heifers. Annual Reciprocal Meat Conference, June 23-26, 2019, Fort Collins, CO, Abstract # 143.

**Manuscript Reviewer (2019 – Present; 18 manuscripts)**

1. *Meat Science*
2. *Journal of Food Science*
3. *LWT-Food Science and Technology*

4. *Journal of Food Science and Technology*
5. *Animal Bioscience*

## **TEACHING**

- Teaching Assistant (Principles of Meat Science – ANEQ 360, Fall 2021)
  - A junior-level course focusing on structure, composition, and biology of muscle and associated tissues; wholesomeness, nutritive value, and palatability of beef, pork, and lamb.
- Teaching Assistant (Introduction to Large Animal Anatomy – ANEQ 105, Spring 2021)
  - A freshman-level course utilizing animal models and preserved animal specimens to familiarize students with the anatomy and anatomical terminology related to large animals.
- Teaching Assistant (Food Animal Science – ANEQ 101, Fall 2020)
  - A freshman-level course focusing on the development, organization, trends, and management of the livestock industry and applying science to the production of food and fiber.
- Teaching Assistant (Advanced Meat Science – ANEQ 525, Spring 2020 & Spring 2022)
  - A graduate-level course offers a unique opportunity to explore the biochemical and molecular basis of meat quality, cellular events that happen during the conversion of muscle-to-meat, and its effects on meat quality.
- Teaching Assistant (Food Chemistry – ANEQ/FTEC 447, Fall 2019)
  - A senior and graduate-level class teaches the chemical and physical properties of proteins, lipids, carbohydrates, pigments, and food additives related to food processing and preservation.
- Teaching Assistant (Live Animal and Carcass Evaluation – ANEQ 250, Fall 2018 & Spring 2019)
  - A sophomore-level class teaching growth, development, and value-determining characteristics of market animals.
- Teaching Assistant (Meat Processing – Fall 2017 & Spring 2018)
  - A senior-level course teaching physical, chemical, and functional characteristics of meat raw materials. Science and technology of value-added processing, including curing, sausage formulation and manufacture, low moisture products, and restructuring.