JUNG Y. SUNG

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Postdoctoral Researcher
Department of Animal Science
North Carolina State University, Raleigh

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EDUCATION

Ph.D., Animal Sciences, Purdue University, West Lafayette, IN — Aug. 2024
Dissertation: Impact of indigestible protein on broiler chickens and pigs
Advisor: Dr. Olayiwola Adeola

M.S., Animal Sciences, Konkuk University, Seoul, South Korea — Feb. 2020
Thesis: Nutritional value of hatchery byproducts fed to nursery pigs
Advisor: Dr. Beob Gyun Kim

B.S., Animal Sciences, Konkuk University, Seoul, South Korea — Feb. 2018

RESEARCH INTEREST

- Precision nutrition in swine and poultry
- Nutritional intervention to improve the intestinal health of swine and poultry
- Modeling procedure to estimate requirements and availability of nutrients

RESEARCH EXPERIENCE

Postdoctoral Researcher — Sep. 2024 to Present
Laboratory of Monogastric Nutrition and Digestive Physiology
Department of Animal Science, North Carolina State University, Raleigh, NC

- Participating in projects that improve intestinal health in pigs through nutrition
- Assisting with supervision of graduate and undergraduate students to conduct research
- Contributing to building database for the new version of Nutrient Requirements of Swine

Graduate Research Assistant — Aug. 2020 to Aug. 2024
Monogastric Nutrition Laboratory
Department of Animal Sciences, Purdue University, West Lafayette, IN

- Compared nutrient utilization of heat-damaged protein sources between pigs and broilers
- Conducted a multi-state research project at a leading organization to develop a protocol for estimating phosphorus digestibility in soybean meal for broilers
- Investigated impact of dietary interventions on gut microbiota in pigs
- Investigated effects of coccidia challenge on gut health and nutrient requirements in broilers

Graduate Research Assistant — Mar. 2018 to Feb. 2020
Swine Nutrition Laboratory
Department of Animal Science & Technology, Konkuk University, Seoul, South Korea

- Evaluated nutritional value of novel animal byproducts in nursery pigs

PEER-REVIEWED PUBLICATIONS

25. H. I. Lee, **J. Y. Sung**, J. Son, K. S. Chae, and B. G. Kim. Effects of homeopathic remedy on performance and behavior of pigs under regrouping stress condition. *Journal of Animal Science* and Technology (Accepted).
24. Zheng, L., **J. Y. Sung**, and S. W. Kim. **2025**. Comparative effects of replacing soybean meal in feeds with processed soybean meal on intestinal health and growth of nursery pigs when fed pharmacological level of zinc. *Animal Bioscience* (Accepted).
23. **Sung, J. Y.**, and O. Adeola. **2025**. Increasing dietary indigestible protein may exacerbate coccidiosis in broiler chickens. *Animal Nutrition* (Accepted).
22. **Sung, J. Y.**, and O. Adeola. **2024**. Prediction of ileal digestible phosphorus in broiler chicken diets supplemented with exogenous phytase. *Canadian Journal of Animal Science* 104:184-189.
21. Haetinger, V. S., **J. Y. Sung**, S. A. Adedokun, W. A. Dozier, C. M. Parsons, M. Rodehutscord, and O. Adeola. **2024**. Ileal phosphorus digestibility of soybean meal for broiler chickens remains consistent across institutions in a collaborative study regardless of non-phytate phosphorus concentration in the pre-experimental starter diet. *Poultry Science* 104:103602.
20. **Sung, J. Y.**, C. S. Park, D. Ragland, M. K. Wiltafsky-Martin, J. C. González-Vega, and O. Adeola. **2024**. Poultry meal autoclaving time-related reduction in amino acid digestibility for broiler chickens and growing pigs. *Journal of Animal Science* 102:skad415.
19. **Sung, J. Y.**, B. J. Emmert, D. M. Karcher, C. L. Walk, and O. Adeola. **2024**. Phosphorus equivalency of exogenous phytase relative to phosphorus in monosodium phosphate in broiler chickens. *Poultry Science* 103:103248.
18. **Sung, J. Y.**, A. S. Aderibigbe, and O. Adeola. **2023**. Amino acid digestibility and net energy concentration in soybean meal for broiler chickens. *Animal Feed Science and Technology* 297:115572.
17. **Sung, J. Y.**, T. A. Johnson, D. Ragland, and O. Adeola. **2023**. Impact of ileal indigestible protein on fecal nitrogen excretion and fecal microbiota may be greater compared with total protein concentration of diets in growing pigs. *Journal of Animal Science* 101:skac409.
16. Kim, H., **J. Y. Sung**, and B. G. Kim. **2022**. The influence of protein concentrations in basal diet on metabolizable energy of soy protein isolate and full-fat soybeans determined by difference procedure in pigs. *Animal Feed Science and Technology* 288:115299.
15. **Sung, J. Y.**, M. K. Wiltafsky-Martin, J. C. González-Vega, and O. Adeola. **2022**. Autoclaving time-related reduction in metabolizable energy in poultry meal is greater in growing pigs compared with broiler chickens. *Journal of Animal Science* 100:skac117.
14. **Sung, J. Y.**, and O. Adeola. **2022**. Estimation of individual feed intake of broiler chickens in group-housing systems. *Poultry Science* 101:101752.
13. **Sung, J. Y.**, S. Y. Ji, and B. G. Kim. **2022**. Additivity of energy concentrations and amino acid, phosphorus, and calcium digestibility in hatchery byproducts fed to nursery pigs. *Animal Bioscience* 35:453-460.
12. Jo, H., **J. Y. Sung**, and B. G. Kim. **2021**. Effects of supplemental xylanase on *in vitro* dry matter disappearance of feed ingredients for swine. *Revista Colombiana de Ciencias Pecuarias* 34:316-323.
11. Kim, J., J. Y. Jeong, **J. Y. Sung**, and B. G. Kim. **2021**. Equations to predict growth performance changes by dietary deoxynivalenol in pigs. *Toxins* 13:360.

10. **Sung**, **J. Y.,** and B. G. Kim. **2021**. Prediction equations for digestible and metabolizable energy concentrations in feed ingredients and diets for pigs based on chemical composition. *Animal Bioscience* 34:306-311.
9. **Sung, J. Y.**, S. Y. Ji, and B. G. Kim. **2020**. Amino acid and calcium digestibility in hatchery byproducts fed to nursery pigs. *Animal Feed Science and Technology* 270:114-703.
8. An, S. H., **J. Y. Sung**, and C. Kong. **2020**. Ileal digestibility and total tract retention of phosphorus in inorganic phosphates fed to broiler chickens using the direct method. *Animals* 10:2167.
7. An, S. H., **J. Y. Sung**, H. K. Kang, and C. Kong. **2020**. Additivity of ileal amino acid digestibility in diets containing corn, soybean meal, and corn distillers dried grains with solubles for male broilers. *Animals* 10:933.
6. **Sung**, **J. Y.,** Y. Song, B. Hong, and B. G. Kim. **2020**. Energy and protein utilization of soybean milk by-products by pigs based on *in vitro* assays. *Revista Colombiana de Ciencias Pecuarias* 34:73-81.
5. Choi, H., **J. Y. Sung**, and B. G. Kim. **2020**. Neutral detergent fiber rather than other dietary fiber types as an independent variable increases the accuracy of prediction equation for digestible energy value in feeds for pigs. *Asian-Australasian Journal of Animal Sciences* 33:615-622.
4. **Sung, J. Y.**, and B. G. Kim. **2020**. Effects of hatchery byproduct mixture on growth performance and energy concentrations of various hatchery byproduct mixtures in nursery pigs. *Animals* 10:174.
3. **Sung, J. Y.**, and B. G. Kim. **2019**. Prediction models for apparent and standardized total tract digestible phosphorus in swine diets. *Animal Feed Science and Technology* 255:114-224.
2. **Sung, J. Y.**, S. Y. Ji, A. R. Son, and B. G. Kim. **2019**. Energy concentration and phosphorus digestibility in hatchery byproducts fed to nursery pigs. *Animals* 9:255.
1. **Sung, J. Y.**, S. Y. Ji, and B. G. Kim. **2018**. Energy utilization of hatchery waste products by pigs can be estimated using *in vitro* data. *Journal of Agriculture and Life Science* 52:63-69.

PUBLICATIONS (SUBMITTED)

5. **Sung, J. Y.**, Z. Deng, and S. W. Kim. Antibiotics and opportunities of their alternatives in pig production: mechanisms through modulating intestinal microbiota on intestinal health and growth. *Antibiotics* (In revision).
4. **Sung, J. Y.**, B. J. Emmert, C. I. Robison, D. M. Karcher, and O. Adeola. The use of quantitative computed tomography for bone ash quantification may avoid euthanasia of young broiler chickens. *Poultry Science* (Submitted).
3. **Sung, J. Y.**, B. J. Emmert, D. M. Karcher, and O. Adeola. Autoclaving young broiler chicken bones for tissue removal may affect measured bone characteristics. *Canadian Journal of Animal Science* (Submitted).
2. Alagbe, E. O., **J. Y. Sung**, K. Lindsey, J. A. Pasternak, and O. Adeola. Technical note: Optimizing sample size for broiler chicken and pig intestinal histomorphometry and prediction equations. *Journal of Animal Science* (Submitted).
1. **Sung, J. Y.**, S. J. You, and B. G. Kim. Ileal digestibility of amino acids in feed ingredients for 22-, 56-, and 87-kilogram pigs. *Journal of Animal Science* (In revision).

ABSTRACTS & PROCEEDINGS

41. **Sung, J. Y.**, and O. Adeola. **2025**. Increasing exogenous phytase increases phosphorus digestibility but decreases hindgut digestion in phosphorus-deficient diets fed to growing pigs. *Digestive Physiology of Pigs* (Submitted).
40. **Sung, J. Y.**, M. K. Wiltafsky-Martin, and O. Adeola. **2025**. The ratio of cystine to protein as a potential indicator of digestible amino acid concentration in heat-damaged animal byproducts for broiler chickens and growing pigs. *Digestive Physiology of Pigs* (Submitted).
39. Deng, Z., **J. Y. Sung,** and S. W. Kim. **2025**. Effects of fermented soybean meal replacing animal protein supplements on jejunal immune challenge and growth of nursery pigs with different body weight at weaning. *Journal of Animal Science* 103 (Submitted).
38. **Sung, J. Y.**, M. K. Wiltafsky-Martin, and O. Adeola. **2025**. Meat and bone meal autoclaving time-related reduction in metabolizable energy for broiler chickens and growing pigs. *Journal of Animal Science* 103 (Submitted).
37. **Sung, J. Y.**, E. O. Alagbe, and O. Adeola. **2024**. Comparison of standardized ileal digestible lysine requirement between non-challenged and coccidia-challenged broiler chickens. *Proceedings of 2024 Poultry Science Association Annual Meeting* P. 204-205.
36. Licuan, D. A., K. R. Stewart, J. Hundley, R. Nepomuceno, M. Robins, R, Crasto, B. Didion, M. Kleve-Feld, **J. Y. Sung**, and A. P. Schinckel. **2024**. Daily thermoregulatory performance patterns of Duroc boars with or without electronically controlled floor cooling pads during the peak summer heat stress period. *Journal of Animal Science* 102 (Suppl. 2):350-351.
35. Licuan, D. A., K. R. Stewart, J. Hundley, R. Nepomuceno, M. Robins, R, Crasto, B. Didion, M. Kleve-Feld, **J. Y. Sung**, and A. P. Schinckel. **2024**. Hourly flushing rates and temperature trends for electronically controlled grouped floor cooling pads trends during the summer heat stress in a boar stud. *Journal of Animal Science* 102 (Suppl. 2):351-352.
34. **Sung, J. Y.**, S. J. Yoo, and B. G. Kim. **2024**. Ileal digestibility of amino acids in feed ingredients for 22-, 56-, and 87-kilogram pigs. *Journal of Animal Science* 102 (Suppl. 2):307.
33. Alagbe, E. O., **J. Y. Sung**, K. Lindsey, J. A. Pasternak, and O. Adeola. **2024**. Optimizing sample size for accurate measurements and prediction equations for intestinal morphology in broiler chickens. *Journal of Animal Science* 102 (Suppl. 2):281-282.
32. **Sung, J. Y.**, D. Ragland, M. K. Wiltafsky-Martin, and O. Adeola. **2024**. Impact of indigestible protein on coccidiosis and meat and bone meal autoclaving time-related reduction in amino acid digestibility for broiler chickens and growing pigs. *Journal of Animal Science* 102 (Suppl. 2):95-96.
31. Haetinger, V. S., **J. Y. Sung**, S. A. Adedokun, W. A. Dozier, C. M. Parsons, M. Rodehutscord, and O. Adeola. **2024**. Starter diet non-phytate phosphorus concentration and research facility do not influence regression-derived ileal phosphorus digestibility of soybean meal for broiler chickens. *Proceedings of 2024 International Poultry Scientific Forum* P. 21.
30. **Sung, J. Y.**, and O. Adeola. **2024**. Increasing dietary indigestible protein may exacerbate effects of coccidia challenge in broiler chickens. *Proceedings of 2024 International Poultry Scientific Forum* P. 52.
29. **Sung, J. Y.**, and O. Adeola. **2023**. Predicting digestible phosphorus in broiler chicken diets supplemented with exogenous phytase. *Proceedings of 2023 Poultry Science Association Annual Meeting*. P. 157-158.
28. **Sung, J. Y.**, B. J. Emmert, C. I. Robison, D. M. Karcher, and O. Adeola. **2023**. Validation of quantitative computed tomography to estimate bone ash and effects of autoclaving on bone

ash in young broiler chickens. *Proceedings of 2023 Poultry Science Association Annual Meeting*. P. 7.

27. Mannion, E. C., T. Casey, A. P. Schinckel, **J. Y. Sung**, W. Oogundare, M. Stansberry, R. M. Stwalley, R. Minor, S. Neeno, T. C. Field. **2023**. Impact of cooling pads and dietary Moringa on measures of heat stress in sows in late gestation. *Journal of Animal Science* 101 (Suppl. 2):348-349.
26. **Sung, J. Y.**, T. A. Johnson, D. Ragland, and O. Adeola. **2023**. Impact of ileal indigestible protein on nitrogen excretion and fecal microbiota may be greater compared with total protein concentration of diets in growing pigs. *Journal of Animal Science* 101 (Suppl. 2):46-47.
25. **Sung, J. Y.**, C. S. Park, D. Ragland, M. K. Wiltafsky-Martin, and O. Adeola. **2023**. Poultry meal autoclaving time-related reduction in amino acid digestibility for broiler chickens and growing pigs. *Journal of Animal Science* 101 (Suppl. 2):190-191.
24. **Sung, J. Y.**, B. J. Emmert, D. M. Karcher, C. L. Walk, and O. Adeola. **2023**. Dietary supplementation of monosodium phosphate and exogenous phytase effects on growth, ileal phosphorus digestibility, and bone characteristics in broiler chickens. *Proceedings of 2023 International Poultry Scientific Forum*. P. 30.
23. **Sung, J. Y.**, M. K. Wiltafsky-Martin, J. C. González-Vega, and O. Adeola. **2022**. Poultry meal autoclaving time-related reduction in energy concentration for broiler chickens. *Proceedings of 2022 Poultry Science Association Annual Meeting*. P. 49.
22. **Sung, J. Y.**, M. K. Wiltafsky-Martin, J. C. González-Vega, and O. Adeola. **2022**. Poultry meal autoclaving time-related reduction in energy utilization for growing pigs. *Journal of Animal Science* 100 (Suppl. 2):172.
21. **Sung, J. Y.**, and O. Adeola. **2022**. Net energy concentration of soybean meal for broiler chickens using the comparative slaughter technique. *Proceedings of 2022 International Poultry Scientific Forum*. P. 105.
20. **Sung, J. Y.**, and O. Adeola. **2022**. Estimation of individual feed intake of broiler chickens in group-housing systems. *Proceedings of 2022 International Poultry Scientific Forum*. P. 21.
19. Kim, H., **J. Y. Sung**, and B. G. Kim. **2020**. Protein concentrations in basal diets affect metabolizable energy of feed ingredients determined by difference procedure in pigs. *Journal of Animal Science* 98 (E-Suppl. 4):340-341.
18. Kim, J., **J. Y. Sung**, and B. G. Kim. **2020**. Equations to predict the effects of dietary deoxynivalenol on the performance of pigs. *Journal of Animal Science* 98 (E-Suppl. 4):348-349.
17. Kim, B. G., and **J. Y. Sung**. **2020**. Additivity of digestible amino acids in hatchery byproducts fed to nursery pigs. *Journal of Animal Science* 98 (E-Suppl. 4):343-345.
16. Kim, H., E. Jang, **J. Y. Sung**, and B. G. Kim. **2020**. A prediction equation for apparent ileal digestibility of crude protein in dog diets based on chemical composition and a comparison of two *in vitro* procedures for dog diets. *Proceedings of 2020 Annual Congress of KASAT*. P. 32.
15. Jang, E., **J. Y. Sung**, S. Y. Ji, and B. G. Kim. **2020**. *In vitro* nutrient utilization of black soldier fly and replacement values of defatted black soldier fly larva meal in corn-fish meal-based swine diets. *Proceedings of 2020 Annual Congress of KASAT*. P. 29.
14. **Sung, J. Y.**, and B. G. Kim. **2019**. Additivity of energy concentrations and phosphorus and calcium digestibility in hatchery byproducts fed to nursery pigs. *Journal of Animal Science* 97 (E-Suppl. 3):356.
13. **Sung, J. Y.**, and B. G. Kim. **2019**. Calcium digestibility in hatchery byproducts fed to nursery pigs. *Journal of Animal Science* 97 (E-Suppl. 3):224.

12. Hong, B., **J. Y. Sung**, and B. G. Kim. **2019**. An equation for digestible energy to gross energy ratio using *in vitro* dry matter disappearance is accurate for ingredients with less fiber contents fed to pigs. *Proceedings of 2019 Annual Congress of KASAT*. P. 34.
11. Kim, H., **J. Y. Sung**, and B. G. Kim. **2019**. Protein utilization of hatchery byproducts by pigs based on *in vitro* assay. *Proceedings of 2019 Annual Congress of KASAT*. P. 96.
10. **Sung, J. Y.,** and B. G. Kim. **2019.** Replacement values of hatchery byproduct in nursery pig diets. *Proceedings of 2019 Annual Congress of KASAT*. P. 98.
9. Song, Y., **J. Y. Sung**, B. Hong, and B. G. Kim. **2018**. Replacement values of soybean milk by-product in corn-soybean meal-based diets fed to pigs. *Proceedings of the 18th AAAP Animal Science Congress*. P. 457.
8. **Sung, J. Y.**, A. R. Son, and B. G. Kim. **2018**. Energy concentrations and phosphorus digestibility in hatchery byproducts fed to nursery pigs. *Journal of Animal Science* 96 (E-Suppl. 3):47.
7. Park, B. C., H. Choi, **J. Y. Sung**, and B. G. Kim. **2018**. An *in vitro* approach to assess nutrient utilization of insect meal and an estimation of replacement values of defatted insect meal as a swine feed ingredient. *Proceedings of 2018 Annual Congress of KASAT*. P. 167.
6. **Sung, J. Y.**, and B. G. Kim. **2018**. *In vitro* dry matter and energy disappearance of hatchery byproducts as swine feed ingredients. *Proceedings of 2018 Annual Congress of KASAT*. P. 160.
5. Song, Y. E., **J. Y. Sung**, B. Hong, and B. G. Kim. **2018**. Evaluation of soybean milk by-products as a swine feed ingredient using *in vitro* assays. *Proceedings of 2018 Annual Congress of KASAT*. P. 57.
4. Kim, J. M., **J. Y. Sung**, and B. G. Kim. **2018**. Effects of supplemental xylanase on *in vitro* dry matter disappearance of swine feed ingredients. *Proceedings of 2018 Annual Congress of KASAT*. P. 55.
3. **Sung, J. Y.**, K. R. Park, and B. G. Kim. **2017**. Prediction equations for digestible and metabolizable energy concentrations based on feed ingredients and diets for pigs. *Journal of Animal Science* 95 (E-Suppl. 4):207.
2. **Sung, J. Y.**, and B. G. Kim. **2017**. Prediction models for standardized total tract digestible phosphorus in swine diets. *Journal of Animal Science* 95 (E-Suppl. 4):58.
1. **Sung, J. Y.**, and B. G. Kim. **2017**. Determination of the weight loss on drying of hatchery byproducts. *Proceedings of 2017 Annual Congress of KASAT*. P. 196.

BOOK CHAPTER

3. Wise, T. L., **J. Y. Sung**, and O. Adeola. **2024**. Advances in understanding and improving the use of enzymes in broiler nutrition. Advances in Poultry Nutrition. Burleigh Dodds Science Publishing Limited. Cambridge, United Kingdom. ISBN: 9781801467315
2. **Sung, J. Y.**, O. Osunbami, and O. Adeola. **2024**. Developing nutritional guidelines for pigs. Advances in Pig Nutrition. Burleigh Dodds Science Publishing Limited. Cambridge, United Kingdom. ISBN: 9781801466943
1. Kim, B. G., and **J. Y. Sung. 2018.** Determination of energy concentrations in hatchery byproducts by nursery pigs. P. 30-39 in Dietary Energy Evaluation Systems in Monogastric Animal Nutrition: Theories & Evaluation Methods. Monogastric Animal Feed Research Institute, South Korea. ISBN: 979-11-965289-0-4

JUNG SUNG | CURRICULUM VITAE

TEACHING EXPERIENCE

Guest Lecturer

- Purdue University – Applied Non-Ruminant Nutrition (ANSC 326) Spring 2024
  Responsible for teaching a lecture (By-products and alternative feed ingredients)
- Purdue University – Non-Ruminant Nutrition (ANSC 522) Fall 2022
  Responsible for teaching 9 lectures (Gut health, minerals, and vitamins)

Teaching Assistant

- Purdue University – Applied Non-Ruminant Nutrition (ANSC 326) Fall 2023, Spring 2024
- Konkuk University – Animal Nutrition Fall 2018, 2019
- Konkuk University – Biostatistics and Practice Fall 2017, 2018, 2019

HONORS & AWARDS

10. **Featherston Outstanding Ph.D. Award**
    Department of Animal Sciences, Purdue University, 2024
9. **Animal Science Young Scholar Award (Invited Speaker)**
    ASAS Annual Midwest Meeting, Madison, WI, 2024
8. **LOUJA Graduate Student Oral Competition Travel Award**
    Department of Animal Sciences, Purdue University, 2023
7. **G. W. Friars International Graduate Student Fellowship**
    Department of Animal Sciences, Purdue University, 2023
6. **Research Paper Award, 3rd place (Graduate Student Oral Competition: Ph.D. Division)**
    ASAS Annual Midwest Meeting, Madison, WI, 2023
5. **Ross Fellowship**
    Purdue University, Fall 2020, Spring 2021
4. **Graduate Scholarship**
    Konkuk University, Spring 2018, Fall 2018, Spring 2019
3. **Research Paper Award (Student Poster Competition)**
    Annual Congress of Korean Society of Animal Sciences, Gwangju, South Korea, 2017
2. **Scholarship Awarded by Cargill Agri. Purina, Inc.**
    Spring 2016, Fall 2016
1. **Merit-based Scholarship**
    Konkuk University, Spring 2012, Spring 2013, Fall 2015, Spring 2016

LEADERSHIP & SERVICE EXPERIENCE

***Ad Hoc* Reviewer** 2020 to Present

- *Animal Feed Science and Technology* (reviewed 24 manuscripts)
- *Animal Bioscience* (reviewed 10 manuscripts)
- *Animal Nutrition* (reviewed 3 manuscripts)

- *Journal of Animal Science* (reviewed 4 manuscripts)
- *Journal of Animal Science and Technology* (reviewed 12 manuscripts)
- *Poultry Science* (reviewed 14 manuscripts)

Judge, National STEM Challenge 2023

- National scientific competition for 6th- to 12th-grade students

Judge, Undergraduate student competition 2023, 2024

- Undergraduate Research Conference, Purdue University

Student Volunteer, Spring Fest (Purdue annual public opening event) 2022, 2023, 2024

- Contributed to organizing the event

Student Mentor 2020 to Present

Department of Animal Sciences, Purdue University & North Carolina State University

- Mentored 15 graduate students with statistical analysis and writing manuscripts
- Mentored 2 undergraduate students with submitting an abstract
  (2023 ASAS Annual Midwest Meeting; Mannion et al., 2023)
  (2024 ASAS Annual Midwest Meeting; Alagbe et al., 2024)

Military Service, Enlisted 2013 to 2014

70th Infantry Regiment, 25th Infantry Division, South Korea

- Fulfilled the role of squad leader

RESEARCH GRANT APPLICATION

PENDING

Title	Year	Amount, $	Source	Role
Fermentation co-products as functional postbiotics for intestinal repair of nursery pigs with enteric diseases	2025	144,000	North Carolina Biotechnology Center	Assisted in protocol and proposal development
Process or not? Fake science by a Japanese TV show could be real science after 20 years	2025	85,000	United Soybean Board	Assisted in protocol and proposal development
Sow milk but not cow milk to young pigs: porcine milk oligosaccharides for intestinal health to prevent post-weaning diarrhea	2025	50,000	NC State Animal Health & Nutrition Consortium	Assisted in protocol and proposal development
Sow milk but not cow milk to young pigs: porcine milk oligosaccharides for intestinal health to prevent post-weaning diarrhea	2025	30,000	North Carolina Biotechnology Center	Assisted in protocol and proposal development

UNFUNDED

Title	Year	Amount, $	Source	Role
Soybean meal is NOT just a protein source: the essentiality of bioactive compounds in soybean meal for intestinal health of disease challenged pigs	2024	67,000	NC Soybean Producers Association	Assisted in protocol and proposal development
Estimation of phosphorus digestibility of Phinite in broiler chickens and pigs	2024	30,000	Phinite	Assisted in protocol and proposal development
Bovine milk coproducts with porcine flavor for the intestinal health of nursery pigs: oligosaccharide-enhanced whey permeate	2024	93,000	NC State Chancellor's Innovation Fund	Assisted in protocol and proposal development
Investigation of the functional roles of a new microbial postbiotic in protecting the intestinal health of disease challenged nursery pigs	2024	93,000	NC State Chancellor's Innovation Fund	Assisted in protocol and proposal development
Effects of *Saccharomyces* yeast postbiotics on intestinal health of broiler chickens challenged with avian pathogenic *Escherichia coli*	2024	50,000	US Poultry & Egg Association	All aspects of grant
Processed peanut hulls as a functional bioactive compound for improving intestinal health in weaned pigs	2024	30,000	NC Peanut Growers Association	Assisted in protocol and proposal development
Detrimental effect of coccidia on growth performance, gut health, and cecal microbiota in broiler chickens may be exacerbated by increase in dietary indigestible protein	2022	46,144	US Poultry & Egg Association	All aspects of grant
Nutritional evaluation of high-oleic soybean meal for broiler chickens	2022	55,067	United Soybean Board	All aspects of grant

PROFESSIONAL SOCIETIES

American Society of Animal Science
Poultry Science Association

Last Updated: 02/23/2025

JUNG SUNG | VISION FOR RESEARCH PROGRAM

Vision For Developing an International Recognized and Externally Funded Research Program Focused on Non-Ruminant Nutrition

Jung Y. Sung

Although optimizing animal nutrition has traditionally focused on improving animals' weight gain and feed efficiency, the increasing emphasis on One Health now demands a broader approach that integrates environmental sustainability with animal and human health. To address these challenges, my research vision is to develop ***precision nutrition*** and ***nutritional interventions to improve the intestinal health*** of swine and poultry by integrating both classical and advanced nutrition.

Precision Nutrition – M.S./Ph.D. Work

Precision nutrition is defined as meeting animals' nutritional needs under specific conditions to avoid nutrient excesses or deficiencies. The first prerequisite for precision nutrition is the **evaluation of feed ingredients**: accurately measuring how animals utilize energy and nutrients from feed ingredients (expressed as digestibility). Measuring nutrient digestibility also offers the potential to develop novel feed ingredients that do not compete with human food sources. In my doctoral work, I determined amino acid digestibility of heat-damaged animal by-products (poultry meal and meat and bone meal) for pigs and broiler chickens. These animal by-products are inedible parts of animal carcasses that were once discarded in landfills before being used in animal feeds. However, these by-products must be heat-treated, which can reduce nutrient utilization, and the severity of heat damage varies across processing plants. By establishing amino acid digestibility values for animal by-products with varying degree of heat damage, my research provides practical guidelines for feed producers to accurately apply the nutritional values of ingredients based on the severity of heat damage and reduce waste.

The second prerequisite for precision nutrition is the accurate estimation of animals' **nutrient requirements** based on the determined nutrient digestibility of feed ingredients. If estimated nutrient requirements exceed the animal's actual needs, excess nutrients are excreted, causing environmental pollution. If requirements are lower than the actual needs, animal growth and health are compromised. Nutrient requirements for growing animals consist of the sum of requirements needed for maintenance and growth. However, immune challenges or stress potentially increase the maintenance requirements to activate the immune system. In my doctoral research, I demonstrated that the lysine requirement for coccidia-challenged broiler chickens is greater than for healthy birds, a well-known concept that had not been previously documented. The results of this study suggest that the ideal protein ratio for coccidia-challenged birds should be re-evaluated based on the estimated lysine requirement.

Nutritional Interventions for the Intestinal Health – Ph.D./Postdoc Work

Intestinal health is important because of its role in modulating immune responses and the interaction between the microbiota, diet, and host, which improves the overall health, welfare, and growth of pigs and chickens. However, modern pigs and chickens face various dietary and environmental challenges that negatively affect their intestinal health. Moreover, reducing antibiotics as growth promoters in swine and poultry diets due to recent pressure, such as legislation, can also compromise intestinal health. Therefore, I aim to improve the intestinal health of pigs and chickens through **nutritional interventions**, including modifications in dietary nutrients or functional feed ingredients/additives.

In my doctoral research, I demonstrated that feeding high-indigestible protein diets increased nitrogen flow into the hindgut, resulting in greater intestinal inflammation, higher nitrogen excretion, and more negative effects on the intestinal microbiota of pigs and chickens when compared with low-indigestible protein diets. This result indicates that swine and poultry diets should be formulated to reduce indigestible protein rather than total protein concentration. In my postdoctoral research, I have evaluated the effects of various processed soy proteins (e.g., fermented soybean meal, enzyme-treated soybean meal, and soy oligopeptides) in reducing nursery pigs' intestinal inflammation resulting from allergenic proteins in regular soybean meal.

Because partially replacing regular soybean meal with processed soy proteins improved the nursery pigs' intestinal health but decreased feed intake, I am working to elucidate the mechanisms behind the reduced appetite. Furthermore, I have tested the effects of feed additives (e.g., yeast postbiotics, phytobiotics, etc.) on the mucosa-associated microbiota, expression of pattern recognition receptors, inflammation, oxidative stress, and morphology in the intestinal tract to identify effective alternatives to antibiotic growth promoters for pigs and chickens.

Future Work

My future research plan is driven by the limitations of precision nutrition and nutritional interventions. Despite extensive research into estimating various animals' amino acid requirements, mortality rates in pig and chicken production remain high (at least 10%). Traditionally, amino acid requirements for pigs and chickens have been determined based on weight gain. However, animals in large-scale production systems often face sub-clinical immune challenges and other stressors that can compromise their health. Recent research indicates that the amino acid requirements for maximizing physiological functions (e.g., gut integrity, antioxidant capacity, etc.) are greater than those needed for optimal growth performance. At Purdue, I aim to re-establish the amino acid requirements for pigs and chickens not just for growth but for physiological resilience—advancing swine and poultry nutrition research to reduce production losses and improve sustainability. Subsequently, I will test whether this approach reduces mortality rates in large-scale production systems.

Furthermore, a reduction in weight gain due to various challenges (e.g., enteric challenge, heat stress, mycotoxin, respiratory disease, etc.) results from a combination of reduced feed intake, lower nutrient utilization (characterized by digestibility, activity of nutrient transporters and enzymes, and intestinal morphology), and compromised muscle protein metabolism (characterized by muscle protein synthesis and degradation). Therefore, I aim to identify which factor has the greatest impact on reduced weight gain for each specific challenge. The pair-feeding assay will be conducted to exclude the impact of reduced feed intake. This understanding allows for tailored nutritional interventions based on the specific challenge, contributing to swine and poultry producers' efforts to optimize their nutrition programs accordingly.

Funding Plan

I will seek external funding from three categories depending on the characteristics of my research pillar (Figure 1): 1) Production associations (e.g., United Soybean Board, U.S. Poultry & Egg Association), 2) Industry partners (e.g., Feed additive or amino acid companies), and 3) Federal agencies (e.g., USDA). I believe that my proposed research on both swine and poultry nutrition has the potential to provide an advantage in securing research funding. Furthermore, I aim to apply for Purdue AgSEED to generate the preliminary data necessary for attracting external funding.

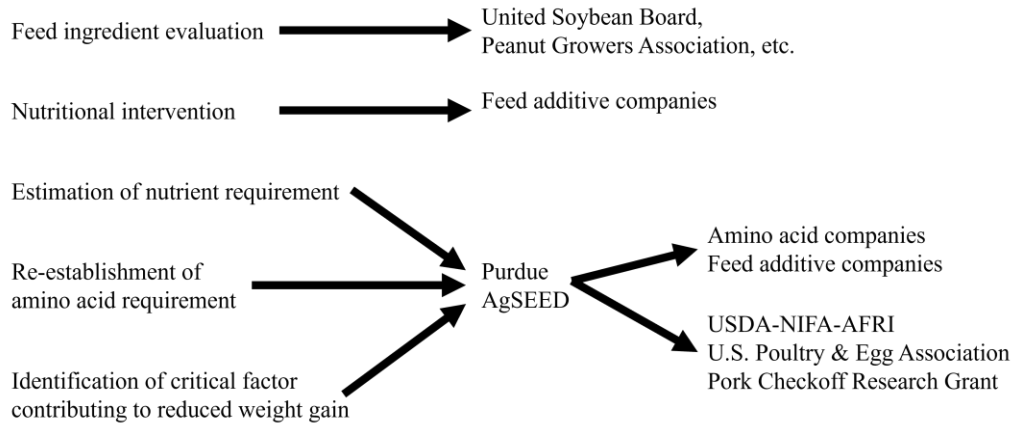

Figure 1. Strategy for obtaining research funding

Teaching Philosophy

Jung Y. Sung

As a faculty applicant for Purdue university, my educational philosophy centers on cultivating students into purposeful and ethical problem-solvers in the field of animal science, whether they choose to pursue careers in academia or industry at the state, national, or international level. Accomplishing this goal involves 1) emphasizing essential knowledge, 2) inspiring students to apply theoretical knowledge, and 3) supporting success through mentorship.

Emphasizing Essential Knowledge

Although knowledge is abundant and readily available, I believe there is indispensable information students should commit to memory, independent of access to external sources. My primary goal when teaching is to help students memorize and utilize this essential knowledge throughout their career. While guest lecturing for *Non-Ruminant Nutrition* course (ANSC 522), I emphasized the crucial nutrition concepts in the field of animal nutrition while also covering a wide range of topics. At the start of the class, I reviewed the key concepts from the previous lecture and summarized the main points from the current lecture at the end. Additionally, I recapped the key concepts every 3 or 4 lectures. As a result, many students, including those who were initially underperforming, comprehended the concepts I aimed to convey throughout the semester, as evidenced by their performance on exams.

Inspiring Students to Apply Theoretical Knowledge

After imparting knowledge, my subsequent goal is to encourage students to actively apply it to address real-world issues. To attain this objective, I structure my lectures with a storyline. For example, as a teaching assistant for *Applied Non-Ruminant Nutrition* course (ANSC 326), each storyline comprised a fundamental question (e.g., What is an appropriate diet for a weaned pig?) to convey the indispensable information (e.g., characteristics of each ingredient and the specific physiological needs of weaned pigs), a concrete example (e.g., commercial diet formulation), and a discussion about current issues and solutions from academia and industry (e.g., banning antibiotics, efforts to reduce dietary protein). This process equips students with the requisite problem-solving skills to tackle even more complex challenges in the future.

To assess student learning, I actively track their responses and dynamically adjust the pace of my instruction in real time. By doing so, I aim to facilitate comprehension for all students, including those who may be struggling with the concepts. Furthermore, I provide students with comprehensive assignments that require integrating knowledge acquired in multiple lectures in lieu of numerous separate tasks. This method of assessment ensures that students are proficient in integrating fragments of knowledge to adeptly address issues and revisit concepts covered in previous lectures that may be easily overlooked, based on my anecdotal experience throughout my teaching career.

Supporting Success through Mentorship

In addition to an effective teaching strategy, academic success ultimately relies on the effort students are willing to invest, underscoring the importance of fostering student motivation. I find great joy in staying in touch with students after they graduate. Once they have established successful careers in various fields, particularly in veterinary science (as many students aim to attend veterinary school), I would like to ask them to share with current students how the course helped shape their career paths, either through an invitation or a video to inspire and motivate students. For instance, I invited alumni who already have taken the class to my teaching labs when

I was teaching *Animal Nutrition* course as a teaching assistant. I realized that having invited alumni to emphasize the importance of the course was more persuasive to students than when I did.

Additionally, after each exam, I plan to recognize students with top scores and those who show significant improvement during the lecture to acknowledge their achievements. By acknowledging their achievements in front of everyone, students who receive awards take pride in their accomplishments, while those who don't may view it as an opportunity to challenge themselves. Moreover, I will have an open-door policy, limited to 20 minutes per student per visit because formal office hours may not be sufficient to answer questions and engage in deeper discussions with students.

Teaching Interests

Considering the scope of my research and teaching experience, I am especially excited about the prospect of teaching nutrition courses including *Principles of Animal Nutrition* (ANSC 221), *Applied Non-Ruminant Nutrition* (ANSC 326), and *Non-Ruminant Nutrition* (ANSC 522).

I am also keen to develop a new course entitled *Basic Statistics for Animal Nutrition* to bridge the gap between theoretical statistical knowledge and its practical application in animal nutrition. When I was a graduate student, I took three statistics courses (STAT 503, 512, and 514). However, I noticed that these courses heavily emphasized the theoretical aspects of statistics, making it challenging for students studying animal nutrition to apply the knowledge to analyzing their own data. For this reason, I am eager to teach students practical skills such as designing experiments to properly assign animals to treatment groups by processing data, using statistical software, creating tables, interpreting results, and writing clear descriptions of their findings for scientific papers with a focus on animal nutrition. Furthermore, I can develop an online course and collaborate with faculty from other departments to develop an interdisciplinary nutrition course.