Haipeng Yu **October 2024**

CONTACT INFORMATION

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RESEARCH INTERESTS

My research interests focus on integrating high-dimensional heterogeneous data to advance genetic improvements in agriculture. Particularly, I am interested in accommodating multi-omics data into genetic evaluations of animals and plants using statistical modeling, machine learning, and computational methods. I am also interested in applying computer vision to collect real-time animal activity data and incorporating the sensor data into my research using machine learning and statistical modeling.

EDUCATION

Virginia Polytechnic Institute and State University, Blacksburg, Virginia USA

Ph.D., Animal and Poultry Sciences - Quantitative Genetics, May 2020

- Dissertation:"Designing and modeling high-throughput phenotyping data in quantitative genetics" [Virginia Tech Libraries]
- Advisor: Dr. Gota Morota

North Dakota State University, Fargo, North Dakota USA

M.S., Animal Sciences - Animal Breeding and Genetics, August 2016

- Thesis:"The exploration of a four-platform standing scale in the application of measuring temperament in beef cattle"
- Advisor: Dr. Lauren Hulsman Hanna

Qingdao Agricultural University, Qingdao, Shandong CHINA

B.S., Veterinary Medicine, July 2013

PROFESSIONAL POSITIONS

Department of Animal Sciences
University of Florida, Gainesville, Florida USA

Assistant Professor of Artificial Intelligence in Animal Omics Sciences — 08/2022 - Present
Principal Investigator
FTE: 75% Research & 25% Teaching

Department of Animal Science
Iowa State University, Ames, Iowa USA

Post-doctoral Fellow — 05/2022 - 08/2022

Computational Breeding Team
Inari Agriculture, West Lafayette, Indiana USA

Computational Breeding Scientist (remote) — 02/2022 - 04/2022

Department of Animal Science
Iowa State University, Ames, Iowa USA

Post-doctoral Fellow 08/2020 - 02/2022

Affiliated Positions

University of Florida, Gainesville, Florida USA

- University of Florida Genetics Institute Faculty Member 08/2022 - Present

Work Experience

Department of Animal and Poultry Sciences
Virginia Polytechnic Institute and State University, Blacksburg, Virginia USA

- Graduate Research Assistant 08/2018 - 05/2020
- Graduate Teaching Assistant Spring 2019 and Spring 2020

Department of Animal Science
University of Nebraska-Lincoln, Lincoln, Nebraska USA

- Graduate Research Assistant 08/2016 - 08/2018

Department of Animal Sciences
North Dakota State University, Fargo, North Dakota USA

- Graduate Teaching Assistant 08/2015 - 05/2016
- Graduate Research Assistant 01/2015 - 05/2016

Professional society memberships

- American Dairy Science Association. 2021 - Present
- American Society of Animal Science. 2017 - Present

Editorial Activities

Guest Editor

- PLOS Computational Biology 2023

Ad Hoc Reviewer

- Number of manuscripts reviewed per journal: BMC Plant Biology (1), Frontiers in Animal Science (1), Frontiers in Plant Science (2), Genetics Selection Evolution (1), Journal of Animal Science (9), Scientific Reports (1), The Plant Genome (1), Translational Animal Science (2)

Preprints

19. De Castro A, Wang J, Bonney-King JG, Morota G, Miller-Cushon EK, and **Yu H**. AnimalMotionViz: an interactive software tool for tracking and visualizing animal motion patterns using computer vision. *bioRxiv*. doi: 10.1101/2024.10.22.619671

18. Casaro S, Prim JG, Gonzalez TD, Cunha F, Silva ACM, **Yu H**, Bisinotto RS, Chebel RC, Santos JE, Nelson CD, Jeon SJ, Bicalho RC, Driver JP, and Galvão KN. Multi-omics integration and

immune profiling identify possible causal networks leading to uterine microbiome dysbiosis in dairy cows that develop metritis. *Research Square*. doi: 10.21203/rs.3.rs-4571697/v1

Peer reviewed journal articles

8 first/corresponding author and 9 co-author

2024

17. Yan H, Jin Y, **Yu H**, Wang C, Wu B, Jone CS, Wang X, Xie Z, and Huang L. Genomic selection for agronomical phenotypes using genome-wide SNPs and SVs in pearl millet. *Theoretical and Applied Genetics*. **137**:244. doi: 10.1007/s00122-024-04754-2

16. **Yu H**, Fernando RL, and Dekkers JCM. Use of the linear regression method to evaluate population accuracy of predictions from non-linear models. *Frontiers in Genetics*. **15**:1380643. doi: 10.3389/fgene.2024.1380643

15. Ugarte Marin MB, Gingerich KN, Wang J, **Yu H**, and Miller-Cushon EK. Effects of space allowance on patterns of activity in group-housed dairy calves. *JDS Communications*. doi: 10.3168/jdsc.2023-0486

14. Wang J, Xiang L, Morota G, Wickens CL, Miller-Cushon EK, Brooks SA, and **Yu H**. Technical note: ShinyAnimalCV: open-source cloud-based web application for object detection, segmentation, and three-dimensional visualization of animals using computer vision. *Journal of Animal Science*. **102**:1-6. doi: 10.1093/jas/skad416

2023

13. Bi Y, Campos LM, Wang J, **Yu H**, Hanigan MD, and Morota G. Depth video data-enabled predictions of longitudinal dairy cow body weight using thresholding and Mask R-CNN algorithms. *Smart Agricultural Technology*. **6**:100352. doi: 10.1016/j.atech.2023.100352

2022

12. de Novais FJ, **Yu H**, Cesar ASM, Momen M, Poleti MD, Petry B, Mourao GB, de Almeida Regitano LC, Morota G, and Coutinho LL. Multi-omic data integration for the study of production, carcass, and meat quality traits in Nellore cattle. *Frontiers in Genetics*. **13**:948240. doi: 10.3389/fgene.2022.948240

2021

11. Clevinger EM, Biyashev R, Lerch-Olson E, **Yu H**, Quigley C, Song Q, Dorrance AE, Robertson AE, Saghai Maroof MA. Identification of Quantitative Disease Resistance Loci towards Four Pythium Species in Soybean. *Frontiers in Plant Science*. **12**:644746. doi: 10.3389/fpls.2021.644746

10. Pegolo S, **Yu H**, Morota G, Bisutti V, Rosa GJM, Bittante G, and Cecchinato A. Structural equation modelling for unravelling the multivariate genomic architecture of milk proteins in dairy cattle. *Journal of Dairy Science*. **104**:5705-5718. doi: 10.3168/jds.2020-18321

9. **Yu H** and Morota G. GCA: An R package for genetic connectedness analysis using pedigree and genomic data. *BMC Genomics*. **22**:119. doi: 10.1186/s12864-021-07414-7

8. **Yu H**, Lee K, and Morota G. Forecasting dynamic body weight of non-restrained pigs from images using an RGB-D sensor camera. *Translational Animal Science*. **5**:1-9. doi: 10.1093/tas/txab006

7. Momen M, Bhatta M, Hussain W, **Yu H**, and Morota G. Modeling multiple phenotypes in wheat using data-driven genomic exploratory factor analysis and Bayesian network learning. *Plant Direct*. **00**:e00304. doi: 10.1002/pld3.304

2020

6. Amorim ST, **Yu H**, Momen M, de Albuquerque, LG, Pereira, ASC, Baldi F, and Morota G. An assessment of genomic connectedness measures in Nellore cattle. *Journal of Animal Science*. **98**:1-12. doi: 10.1093/jas/skaa289

5. **Yu H**, Morota G, Celestino EF, Dahlen CR, Wagner SA, Riley DG, and Hanna LLH. Deciphering cattle temperament measures derived from a four-platform standing scale using genetic factor analytic modeling. *Frontiers in Genetics*. **11**:599. doi: 10.3389/fgene.2020.00599

2019

4. Hanna LLH, Hieber JK, **Yu H**, Celestino Jr EF, Dahlen CR, Wagner SA, and Riley DG. Blood collection has negligible impact on scoring temperament in Angus-based weaned calves. *Livestock Science*. **230**:103835. doi: 10.1016/j.livsci.2019.103835

3. **Yu H**, Campbell MT, Zhang Q, Walia H, and Morota G. Genomic Bayesian confirmatory factor analysis and Bayesian network to characterize a wide spectrum of rice phenotypes. *G3: Genes, Genomes, Genetics*. **9**:1975-1986. doi: 10.1534/g3.119.400154

2018

2. **Yu H**, Spangler ML, Lewis RM, and Morota G. Do stronger measures of genomic connectedness enhance prediction accuracies across management units? *Journal of Animal Science*. **96**:4490-4500. doi: 10.1093/jas/sky316

2017

1. **Yu H**, Spangler ML, Lewis RM, and Morota G. Genomic relatedness strengthens genetic connectedness across management units. *G3: Genes, Genomes, Genetics*. **10**:3543-3556. doi: 10.1534/g3.117.300151

Peer reviewed conference Proceedings

2022

4. **Yu H**, van Milgen J, Knol EF, Fernando RL, and Dekkers JCM. 2022. A bayesian hierarchical model to integrate a mechanistic growth model in genomic prediction. In: *Proceedings, 12th World Congress of Genetics Applied to Livestock Production*. July 3-8, Rotterdam, The Netherlands. [PDF]

3. Dekkers JCM, Su H, Kramer L, and **Yu H**. 2022. An approach for the design of breeding programs using genomics. In: *Proceedings, 12th World Congress of Genetics Applied to Livestock Production*. July 3-8, Rotterdam, The Netherlands. [PDF]

2. Ni Z, Fernando RL, **Yu H**, Knol EF, Dekkers JCM. 2022. Genomic prediction of longitudinal body weights in pigs using a neural network. In: *Proceedings, 12th World Congress of Genetics Applied to Livestock Production*. July 3-8, Rotterdam, The Netherlands. [PDF]

2018

1. **Yu H**, Spangler ML, Lewis RM, and Morota G. 2018. Stronger measures of genomic connectedness enhance prediction accuracies across management units. In: *Proceedings, 11th World Congress of Genetics Applied to Livestock Production*. **11**:406. February 11-16, Auckland, New Zealand. [PDF]

bioRxived manuscripts

1. Campbell M, **Yu H**, Momen M, and Morota G. Examining the relationships between phenotypic plasticity and local environments with genomic structural equation models. *bioRxiv*. doi: 10.1101/2019.12.11.873257

Invited Presentations

2024

4. Improving livestock farming systems using artificial intelligence. 2024 Summer Research Experience Conference. Bridging the Gap: Training Next Generation Scientists Using Animal Health Technologies. North Dakota State University, Fargo, ND. July 30.

3. A Method to Compute Genomic Window Variances That Are Invariant to Dimension-Reducing Transformations between Equivalent Multiple-Regression Models. Feed Platform Meeting. Topigs Norsvin. Online. April 18.

2. ShinyAnimalCV: open-source cloud-based web application for object detection, segmentation, and three-dimensional visualization of animals using computer vision. In-Service Training- AI Essentials for Extension. Gulf Coast Research and Education Center, Wimauma, FL. April 9.

1. A Method to Compute Genomic Window Variances That Are Invariant to Dimension-Reducing Transformations between Equivalent Multiple-Regression Models. Plant & Animal Genome Conference / PAG 31. Town and Country Hotel, San Diego, CA. January 12-17. [Abstract]

2023

8. Development of user-friendly open-source computer vision tools for precision livestock farming. 2023 National Swine Improvement Federation. Hilton St. Louis at the Ballpark, St. Louis, MO. October 24-26.

7. The application of AI for precision livestock farming. AI in Agriculture: From Lab to Table, Applications of AI Models Across the Agricultural Value Chain. UF AI Days. University of Florida, Gainesville, FL. October 18.

6. Development of user-friendly open-source computer vision tools for precision livestock farming. UF/IFAS AI seminars. University of Florida, Gainesville, FL. September 29.

5. Bayesian hierarchical inference to integrate high-dimensional growth and composition traits into genomic evaluation of pigs. Feed Platform Meeting. Topigs Norsvin. Online. April 20.

4. Bayesian hierarchical inference to integrate high-dimensional growth and composition traits into genomic evaluation of pigs. Genomic Selection and Genome-Wide Association Studies. Plant & Animal Genome Conference / PAG 30. Town and Country Hotel, San Diego, CA. January 13-18. [Abstract]

2022

3. Integrating high-dimensional heterogeneous omics data to advance animal agriculture. Animal Science Seminar. Department of Animal Science. University of California, Davis, CA. November 21.

2. Integrating high-dimensional heterogeneous omics data to advance animal agriculture using artificial intelligence. UF/IFAS Artificial Intelligence Summit. University of Florida, Gainesville, FL. June 21.

1. Bayesian hierarchical inference to integrate a nutritional growth model into genomic evaluation of pigs. Feed Platform Meeting. Topigs Norsvin. Online. April 21.

Contributed Presentations

2023 **8**. ShinyAnimalCV: Interactive web application for object detection and three-dimensional visualization of animals using computer vision. ASAS-CSAS-SSASAS Annual Meeting. Albuquerque, NM. July 16-20.

2021 **7**. A Bayesian hierarchical model to integrate growth models into genomic evaluation of pigs. ASAS-CSAS-SSASAS Annual Meeting and Trade Show. Online. July 14-23.

2020 **6**. Development of image analysis pipeline to predict body weight in pigs. EAAP Annual Meeting 2020. Online. December 3.

5. Development of image analysis pipeline to predict body weight in pigs. ASAS-CSAS-WSASAS Virtual Annual Meeting and Trade Show. Online. July 19-23.

2019 **4**. Precision agriculture on cattle temperament: Utilizing factor analysis and multi-trait modeling to characterize a four-platform standing scale. NCERA-225 Annual Meeting. Implementation and Strategies for National Beef Cattle Genetic Evaluation. Blacksburg, VA. October 10-11.

2018 **3**. An assessment of genomic relatedness across management units. ADSA-ASAS 2018 Midwest Meeting. Omaha, NE. March 12-14.

2017 **2**. Stronger measures of genomic connectedness enhance prediction accuracies across management units. NCERA-225 Annual Meeting. Implementation and Strategies for National Beef Cattle Genetic Evaluation. Stanley Stout Livestock Marketing Center, Manhattan, KS. October 18-19.

1. Genomic relatedness strengthens genetic connectedness across management units. ASAS-CSAS Annual Meeting and Trade Show. Baltimore, MD. July 8-12.

Intramural Seminars

2024 • Wise Use of Generative AI in Research. Animal Sciences Graduate Student Association seminar. Department of Animal Sciences, University of Florida. March 20.

2023 • Development of User-Friendly Open-Source Computer Vision Tools for Animal Science Research. Animal Molecular & Cellular Biology seminar. Department of Animal Sciences, University of Florida. August 25.

• Animal Genetics and Genomics seminar. Department of Animal Sciences, University of Florida. April 25.

2021 • Animal Breeding and Genetics seminar. Department of Animal Science, Iowa State University. September 3.

2020 • Animal Breeding and Genetics Graduate Student Organization seminar. Department of Animal Science, Iowa State University. October 2.

• Animal Breeding and Genetics seminar. Department of Animal Science, Iowa State University. September 18.

- Ph.D. Thesis Defense. Department of Animal and Poultry Sciences, Virginia Polytechnic Institute and State University. March 18.

2019

- Ninth Annual Animal and Poultry Sciences Research Symposium. Department of Animal and Poultry Sciences, Virginia Polytechnic Institute and State University. May 21.
- The Reproductive Biology Club. Department of Animal and Poultry Sciences, Virginia Polytechnic Institute and State University. April 19.

2018

- Animal Breeding and Genetics seminar. Department of Animal Science, University of Nebraska-Lincoln. February 28.

2017

- Animal Breeding and Genetics Seminars. Department of Animal Sciences, University of Nebraska-Lincoln. September 29.

2016

- M.S. Thesis Defense. Department of Animal Sciences, North Dakota State University. May 17.

Teaching

University of Florida, Gainesville, Florida, USA

Lead Instructor

- ANS 6932 Digital Data Analysis for Precision Livestock Farming — Fall 2023
- ANS 6939 Artificial Intelligence in Animal Sciences Journal Club — Spring 2024

Virginia Polytechnic Institute and State University, Blacksburg, Virginia, USA

Guest Instructor

- GWAS Workshop [Slides] — Summer 2019

Graduate Teaching Assistant

- APSC 5984/20816: Complex Trait Genomics [WWW] — Spring 2020
- ALS 3104: Animal Breeding and Genetics — Spring 2019

Tutorials

- Factor Analytic Model [WWW]
- Gaussian Bayesian Network [WWW]
- Structural Equation Model GWAS [WWW]

University of Nebraska-Lincoln, Lincoln, Nebraska, USA

Guest Instructor

- ASCI 944 / STAT 844 Quantitative Methods for Genomics of Complex Traits [Slides] [WWW] — Spring 2018

North Dakota State University, Fargo, North Dakota USA

Graduate Teaching Assistant

- ANSC 357: Animal Genetics — Spring 2016
- AGRI 189: Skills for Academic Success — Fall 2015

Short courses

Florida ASABE Continuing Education Program, Jensen Beach, Florida, USA

Lead Instructor

Building Computer Vision Interactive Web Applications for Animal Detection, Segmentation, and 3D Visualization — June 12, 2024

Research Support

External Funding

- Animal Health and Production and Animal Products: Animal Breeding, Genetics, and Genomics - $93,785.00 — USDA-NIFA (Subaward from Principal Grant)
  PI: Jack Dekkers — May, 2023 - May, 2024
  Proposal: Integration Of Biological Models In Genomic Evaluation: Pig-Growth-Model Whole Genome Prediction
  Role: Subaward Principal Investigator

Internal Funding

- 2023 CALS Instructional Improvement Mini Grant. - $2,293.99 — UF
  PI: Justin Callaham
  Proposal: Micro-GPU's for Use in AI in Animal Sciences Courses
  Role: Co-Principal Investigator

- Launching Innovative Faculty Teams in AI (LIFT AI) - $24,987.00 — UF
  PI: Huiping Yang — September, 2022 - December, 2023
  Proposal: Integrating High-Throughput Phenotyping into Genomic Evaluation to Advance Northern Quahogs Mercenaria mercenaria Breeding
  Role: Co-Principal Investigator

- Launching Innovative Faculty Teams in AI (LIFT AI) - $24,025.00 — UF
  PI: Jeongim Kim — September, 2022 - December, 2023
  Proposal: Dissecting genetic controls of plant root and shoot architecture using AI methods
  Role: Co-Principal Investigator

Advisees and trainees

Ph.D. students

2. Angelo Legarda De Castro [WWW] — 08/2024 -

1. Jin Wang [WWW] — 01/2023 -

M.S. students

1. Yuxi Zhang [WWW] — 08/2024 -

Visiting B.S. students

1. Lucas Basolli Borsatto, University of São Paulo [WWW] — 08/2024 -

Research interns

5. Yuechen Guo, Department of Electrical and Computer Engineering, UF 11/2023 -

4. Yu Hu, Department of Electrical and Computer Engineering, UF 03/2023 - 10/2023

3. Fan Zhao, Department of Electrical and Computer Engineering, UF 11/2022 - 07/2023

2. Yugang Duan, Department of Electrical and Computer Engineering, UF 12/2022 - 05/2023

1. Yue Li, Department of Electrical and Computer Engineering, UF 09/2022 - 12/22

Thesis Committees

Ph.D. Thesis Committees

4. Carlos Angelino Nino De Guzman Cerna 2024 -
   Department of Animal Sciences, University of Florida
   Major advisor: Albert De Vries

3. Ali Imtiaz 2023 -
   Department of Animal Sciences, North Dakota State University
   Major advisor: Lauren L. Hulsman Hanna

2. Maria Belen Ugarte Marin 2023 -
   Department of Large Animal Clinical Sciences, University of Florida
   Major advisor: Rafael Sisconeto Bisinotto

1. Gabriel Antonio Zayas Santiago 2023 -
   Department of Animal Sciences, University of Florida
   Major advisor: Raluca Mateescu

M.S. Thesis Committees

1. Anna Hanson 2024
   Department of Animal Sciences, University of Florida
   Major advisor: Albert De Vries

Visitors hosted

- Dr. Rohan Fernando, Iowa State University April, 2024

Service Activities

Multistate research activities

- NC1211: Precision Management of Animals for Improved Care, Health, and Welfare of Livestock and Poultry University of Florida representative 2023 - Present

University

- UF/IFAS Faculty AI Working Group (FAWG) Committee August, 2023 - August, 2025

Software developments

Computer vision software

- ShinyAnimalCV - https://github.com/uf-aiaos/ShinyAnimalCV
- AnimalMotionViz - https://github.com/uf-aiaos/AnimalMotionViz

R package

- GCA - https://github.com/uf-aiaos/GCA

Participation in meetings, symposiums, and workshops

2023

- 2nd U.S. Precision Livestock Farming Conference (USPLF 2023). University of Tennessee Conference Center, Knoxville, TN. May 21–24.
- AI in Agriculture: Innovation and Discovery to Equitably Meet Producer Needs and Perceptions. Marriott Orlando Airport Lakeside, Orlando, FL. April 17-19.
- Leveraging High-Throughput Phenotyping Techniques to Study Complex Traits. Quantitative Genetics and Genomics Gordon Research Conference. Four Points Sheraton/Holiday Inn Express, Ventura, CA. February 12-17.

2021

- Poultry Breeder's Roundtable & National Swine Improvement Federation Joint Meeting. Marriott St. Louis Grand, St. Louis, MO. November 30 - December 2.

2020

- The 6th International Conference of Quantitative Genetics. Online. November 2-12.
- The Plant and Animal Genome XXVIII Conference. Town and Country Hotel, San Diego, CA. January 11-15.

2015

- NCERA-225 Annual Meeting. Implementation and Strategies for National Beef Cattle Genetic Evaluation. North Dakota State University, ND. October 22-23.
- Graduate Learning Conference for College Teaching. North Dakota State University, ND. August 17-18.
- WERA-1: Beef Cattle Breeding in the Western Region. Miles City, MT. May 19-20.
- ADSA-ASAS Midwest Meeting. Des Moines, IA. March 15-18.

Honors/ Awards

2020

- The 6th International Conference of Quantitative Genetics US-Based Early Career Researcher Scholarship. Online. November.

2019

- 24th Summer Institute in Statistical Genetics (SISG) Scholarship, University of Washington, Seattle, WA, July.

- Ninth Annual Animal and Poultry Sciences Research Symposium Travel Award $400, Virginia Polytechnic Institute and State University, May.

2015

- Frank Bain Graduate Student Scholarship $1,650, North Dakota State University, Spring.

2009-2013

- Outstanding Undergraduate Scholarship, Qingdao Agricultural University, China.