Haipeng Yu **July 2023**

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 **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

Ad Hoc Reviewer

- Number of manuscripts reviewed per journal: BMC Plant Biology (1), Frontiers in Animal Science (1), Journal of Animal Science (7), Scientific Reports (1), The Plant Genome (1), Translational Animal Science (2)

Preprints

15. 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. *arXiv*. doi: arXiv:2307.14487

14. 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. *arXiv*. doi: 10.48550/arXiv.2307.01383

13. **Yu H**, Fernando RL, and Dekkers JCM. Validation of the linear regression method to evaluate population accuracy and bias of predictions for non-linear models. *bioRxiv*. doi: 10.1101/2022.10.02.510518

Peer reviewed journal articles

6 first author and 6 co-author

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

2023

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. November 21.

2. Integrating high-dimensional heterogeneous omics data to advance animal agriculture using artificial intelligence. UF/IFAS Artificial Intelligence Summit. University of Florida. 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, New Mexico, July 16-20, 2023

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

2023

- 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

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**

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

1. Jin Wang [WWW] 01/01/2023 -

Thesis Committees

Ph.D. Thesis Committees

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

1. Camila Santos Rojas 2023 -
   Department of Animal Sciences, University of Florida
   Major advisor: Raluca Mateescu

M.S. Thesis Committees

1. Anna Hanson 2023 -
   Department of Animal Sciences, University of Florida
   Major advisor: Albert De Vries

Software developments

Computer vision software

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

R package

- GCA - https://github.com/HaipengU/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.

Additional training

2019 • Deep Learning for Computer Vision Workshop, Virginia Tech, VA, September 6.

• 24th Summer Institute in Statistical Genetics (SISG), University of Washington, Seattle, WA, July 17-24.

2018 • Programming and Computer Algorithms in Animal Breeding With Focus on Genomic Selection and Single-Step GBLUP, University of Georgia, GA, May 7-25.

2017 • Introduction to Graphical Models With Applications to Quantitative Genetics and Genomics, Iowa State University, IA, June 19-23.

• Software Carpentry Workshop. University of Nebraska-Lincoln, NE, January 5-6.