Ye Bi **November 2024**

CONTACT INFORMATION

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175 West Campus Drive
Virginia Tech
Blacksburg, Virginia 24061 USA

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RESEARCH INTERESTS

I recently defended my Ph.D. dissertation in the School of Animal Sciences at Virginia Tech and expect to graduate in December 2024. My research interests focus on incorporating artificial intelligence, computer vision, statistics, phenomics, and genetics to study animal and plant sciences.

CURRENT RESEARCH PROJECTS

Precision Livestock Farming

- Depth video data-enabled predictions of longitudinal dairy cow body weight using thresholding and Mask R-CNN algorithms
- Industry-scale prediction of video-derived pig body weight using efficient convolutional neural networks and vision transformers
- Evaluation of dairy cow body condition scores via computer vision approaches

Quantitative Genetics

- Evaluating metabolic and genomic data for predicting grain traits under high night temperature stress in rice
- Genomic prediction for rice grain metabolites under high night temperature stress
- The impact of trait measurement error on quantitative genetic analysis
- Genetic analysis of high-throughput phenotyping data for sesame

EDUCATION

Virginia Polytechnic Institute and State University, Blacksburg, Virginia USA

Ph.D., Animal Sciences, August 2021 - December 2024

- Thesis: "Digital phenotyping and genomic prediction using machine and deep learning in animals and plants"
- Advisor: Dr. Gota Morota
- Committee: Drs. Mark Hanigan, Ismini Lourentzou, Nicholas Santantonio,

Graduate Certificate in Data Analytics, January 2024 [URL]

- Completed 15 credits related to advanced data science courses from the Departments of Computer Science, Electrical and Computer Engineering, and Statistics.

University of California Davis, Davis, California USA

M.S., Animal Biology, September 2021

- Thesis: "Longitudinal Analysis of CD4 and CD8 T Cell Receptor Repertoires Associated with Newcastle Disease Virus Infection in Layer Birds"
- Advisor: Dr. Huaijun Zhou
- Committee: Drs. Rodrigo A Gallardo and Charles L. Bevins
- Available at UC Davis Libraries.

Chinese Academy of Agricultural Sciences, Beijing, Beijing China

M.S., Animal Nutrition and Feed Science, July 2017

- Thesis: "Effects of Dietary Threonine Level on Traits of Peking Ducks from Hatch to 21 Days"
- Advisor: Dr. Benhai Xiong
- Committees: Drs. Shuisheng Hou, Jilan Chen, Taozhen Jiang, and Yu Chen

Shandong Agricultural University, Taian, Shandong China

B.S., Animal Science, July 2014

- Thesis: "Effect of Rumen Fluid Osmotic Pressure on Absorption of VFAs in Rumen Epithelium of Sheep"
- Advisor: Dr. Yunliang Jiang

Work Experiences

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

- Graduate Research Assistant **09/2021 - 12/2024**

Precision Animal Health Group
Zoetis, Inc., Kalamazoo, Michigan USA

- Precision Animal Health Data Science Intern **05/2024 - 08/2024**
- Advisor: Dr. Di Liang

Department of Animal Biology
University of California Davis, Davis, California USA

- Graduate Research Assistant **08/2019 - 08/2021**

Manuscripts under review

2024

4. **Ye Bi**, Yijian Huang, Jianhua Xuan, and Gota Morota. Industry-scale prediction of video-derived pig body weight using efficient convolutional neural networks and vision transformers. [GitHub].

3. Sanjana Bharadwaj, Pranjal Ranjan, Yingqi Pei, Jay Yim, **Ye Bi**, Dong Ha, Gota Morota, and Sook Shim Ha. Enhancing pig weight prediction with robust deep learning approaches in video image analysis.

2. Mingsi Liao, Gota Morota, **Ye Bi**, and Rebecca Cockrum. Comparison of deep learning (YOLOv8) and threshold-based nethods for depth image segmentation using extreme gradient boosting to predict dairy calf body weight.

1. **Ye Bi**, Harkamal Walia, Toshihiro Obata, and Gota Morota. Genomic prediction of metabolic content in rice grain in response to warmer night conditions. [GitHub].
doi: 10.1101/2024.07.23.604827.

Peer-reviewed research journal articles

2024

12. Sabag I, Bi, Y, Sahoo MM, Herrmann I, **Morota G**, and Peleg Z. 2024. Leveraging genomics and temporal high-throughput phenotyping to enhance association mapping and yield prediction in sesame. The Plant Genome. Early view. doi: 10.1002/tpg2.20481

11. Kenan Burak Aydin, **Ye Bi**, Luiz F. Brito, Zafer Ulutaş, and Gota Morota. Review of sheep breeding and genetic research in Türkiye. *Frontiers in Genetics*. **15**:1308113. doi: 10.3389/fgene.2024.1308113

2023

10. **Ye Bi**, Leticia M. Campos, Jin Wang, Haipeng Yu, Mark D. Hanigan, and Gota Morota. 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

9. Zhangyuan Pan, Ying Wang, Mingshan Wang, Yuzhe Wang, Xiaoning Zhu, Shenwen Gu, Conghao Zhong, Liqi An, Mingzhu Shan, Joana Damas, Michelle M. Halstead, Dailu Guan, Nares Trakooljul, Klaus Wimmers, **Ye Bi**, Shang Wu, Mary E. Delany, Xuechen Bai, Hans H. Cheng, Congjiao Sun, Ning Yang, Xiaoxiang Hu, Harris A. Lewin, Lingzhao Fang, and Huaijun Zhou. An atlas of regulatory elements in chicken: A resource for chicken genetics and genomics. *Science Advance*. **9**:eade1204(2023). doi: 10.1126/sciadv.ade1204

8. **Ye Bi**, Rafael Massahiro Yassue, Puneet Paul, Balpreet Kaur Dhatt, Jaspreet Sandhu, Thi Phuc Do, Harkamal Walia, Toshihiro Obata, and Gota Morota. 2023. Evaluating metabolic and genomic data for predicting grain traits under high night temperature stress in rice. *G3: Genes, Genomes, Genetics*. doi: 10.1093/g3journal/jkad052

7. Idan Sabag, **Ye Bi**, Zvi Peleg, and Gota Morota. 2023. Multi-environment analysis enhances genomic prediction accuracy of agronomic traits in sesame. *Frontiers in Genetics*. **14**:1108416. doi: 10.3389/fgene.2023.1108416

2022

6. Robert Kadlec, Sam Indest, Kayla Castro, Shayan Waqar, Leticia M Campos, Sabrina T Amorim, **Ye Bi**, Mark D Hanigan, and Gota Morota. 2022. Automated acquisition of top-view dairy cow depth image data using an RGB-D sensor camera. *Translational Animal Science*. **6**:1-6. doi: 10.1093/tas/txac163

2017

5. **Ye Bi**, Xuemei Nan, Shanshan Zheng, Linshu Jiang, Benhai Xiong. Effects of dietary threonine and immune stress on growth performance, carcass trait, serum immune parameters, and intestinal muc2 and NF-kb gene expression in Pekin ducks from hatch to 21 days. *Poultry Science*, 2017, 97(1): 177-187. doi: 10.3382/ps/pex283

4. **Ye Bi**, Hairui Xin, Xiaohua Pan, Benhai Xiong. Effects of dietary threonine level on growth performance, carcass traits, immune function and serum hormone of Peking ducklings. *Chinese Journal of Animal Nutrition*, 2017, 29(6): 1913-1920. doi: link

3. **Ye Bi**, Xiaohua Pan, Hairui Xin, Benhai Xiong. Research progress of the influence of threonine on poultry nutrition[J]. *China Animal Husbandry and Veterinary Medicine*, 2017, 44(8): 2326-2332. doi: link

2016

2. Hairui Xin, Xiaohua Pan, Liang Yang, **Ye Bi**, Benhai Xiong. Effects of Light Intensity on Performance, Carcass Performance and Meat Quality of Peking Ducks. *Chinese Journal of Animal Nutrition*, 2016, 28(4): 1076-1083. doi: link

1. Hairui Xin, Xiaohua Pan, **Ye Bi**, Benhai Xiong, Linshu Jiang. Effects of Lighting Regimes on Production Performance, Carcass Performance and Anti-Oxidant Capacity of the Blood in Peking Ducks. *Journal of Integrative Agriculture*, 2016, 49(23): 4638-4645. doi: link

Contributed Presentations

2024

2. Ye Bi. Industry-scale prediction of video-derived pig body weight using efficient convolutional neural networks and vision transformers. 2024 ASAS-CSAS-WSASAS Annual Meeting. Calgary TELUS Convention Centre, Calgary, Alberta, Canada. July 21-25, 2024.

1. Ye Bi. The impact of trait measurement error on quantitative genetic analysis. 2024 ASAS-CSAS-WSASAS Annual Meeting. Calgary TELUS Convention Centre, Calgary, Alberta, Canada. July 21-25, 2024.

2023

1. Ye Bi. Depth video data-enabled predictions of longitudinal dairy cow body weight using thresholding and Mask R-CNN algorithms. 2023 ASAS-CSAS-WSASAS Annual Meeting. Albuquerque, New Mexico. July 16-20.

Intramural Seminars

2024

4. Ye Bi. Digital phenotyping and genomic prediction using machine and deep learning in animals and plants. Exit Seminar. School of Animal Sciences. Virginia Polytechnic Institute and State University, Blacksburg, VA. September 18.

2023

3. Ye Bi. Depth video data-enabled predictions of longitudinal dairy cow body weight using thresholding and Mask R-CNN algorithms. School of Animal Sciences Research Day. Virginia Polytechnic Institute and State University, Blacksburg, VA. May 16.

2022

2. Ye Bi. Utility of Metabolites and Single-Nucleotide Polymorphisms for Classification of High Night Temperature Stress Conditions and Prediction of Grain Size Related Traits in Rice. Virginia Polytechnic Institute and State University, Blacksburg, VA, Sep 09.

1. Ye Bi. Evaluating Dairy Cow Body Condition Scores Using Automated Computer Vision Systems. Department of Animal and Poultry Sciences Research Day. Virginia Polytechnic Institute and State University, Blacksburg, VA. May 19.

Invited Presentations

2024

3. Ye Bi. Enhancing pig body weight estimation and genetic analysis using computer vision and deep learning. ANSC Seminar. Department of Animal Science. The Pennsylvania State University, University Park, PA. September 5.

2023

2. Ye Bi. Animal data science applied to digital data. Special Seminar. Smithfield Premium Genetics. Rose Hill, NC. August 14.

2022

1. **Ye Bi**. Evaluating Dairy Cow Body Condition Scores Using Automated Computer Vision Systems. Department of Animal Science. Shandong Agricultural University. Online. July 22.

Posters

2023

3. **Ye Bi**. Depth video data enabled prediction of dairy cow body weight. Virginia Tech Center for Advanced Innovation in Agriculture (CAIA) Big Event. Poster Presentation. March 16.

2022

2. **Ye Bi**. Development of Automated Computer Vision Systems for Evaluating Dairy Cow Body Weight and Body Condition Scores. ASAS-CSAS 2022 annual meeting, Oklahoma City, Oklahoma. Poster Presentation. June 26-30.

1. **Ye Bi**. Evaluating Dairy Cow Body Condition Scores Using Automated Computer Vision Systems. Virginia Tech Center for Advanced Innovation in Agriculture (CAIA) Big Event. Poster Presentation. March 28.

Peer reviewed conference Proceedings

2022

4. Zhangyuan Pan, Ying Wang, Liqi An, **Ye Bi**, Dailu Guan, Mary E. Delany, Hans H. Cheng, Huaijun Zhou. Functional annotations of regulatory elements in the chicken genome. *Proceedings of 12th World Congress on Genetics Applied to Livestock Production (WCGALP)*. doi: link

3. **Ye Bi**, Robert Kadlec, Kayla Castro, Sam Indest, Sabrina Amorim, Gota Morota. Development of Automated Computer Vision Systems for Evaluating Dairy cow Body Weight and Body Condition Scores. *ASAS-CSAS 2022 annual meeting*, Oklahoma City, Oklahoma. June 26-30. doi: link

2016

2. **Ye Bi**, Hairui Xin, Benhai Xiong. Effects of dietary threonine level on traits of Peking ducks from hatch to 21 days. *The 12th National Conference about Animal Nutrition of Animal Nutrition Branch of Chinese Association of Animal Science and Veterinary Medicine*. doi: link

1. Hairui Xin, **Ye Bi**, Benhai Xiong. Effects of Lighting Regimes on Blood Calcium Phosphate Level and Anti-Oxidant Capacity of the Blood in Peking Ducks. *The 12th National Conference about Animal Nutrition of Animal Nutrition Branch of Chinese Association of Animal Science and Veterinary Medicine*. doi: link

Editorial activities

Ad Hoc Reviewer

- Number of manuscripts reviewed per journal: Journal of Animal Science (9), Scientia Agricola (3), Artificial Intelligence in Agriculture (1), Brazilian Journal of Animal Science (1).

Teaching

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

Guest Lectures

- ALS 3104 Animal Breeding and Genetics **Spring/2024**
  Use of Genetic Markers in Animal Breeding
- ALS 3104 Animal Breeding and Genetics **Spring/2023**
  Statistical Concepts in Quantitative Genetics

Teaching Assistant

- ALS 3104 Animal Breeding and Genetics **Spring/2024**
- ALS 3104 Animal Breeding and Genetics **Spring/2023**
- ALS 3104 Animal Breeding and Genetics **Spring/2022**

University of California Davis, Davis, California, USA

Teaching Assistant

- ANS150 Animal Health and Disease **Spring/2020**
- ABI102 Animal Biochemistry and Metabolism **Fall/2019**

Honor and Awards

2024
- Agricultural Genome to Phenome Initiative (AG2PI) Student Conference Travel Award ($1500), U.S. Department of Agriculture (USDA), National Institute of Food and Agriculture (NIFA).
- CAIA Graduate Student Travel Awards program ($1000), Virginia Tech.

2023
- The Summer 2023 Cycle Travel Fund Program ($300), Graduate and Professional Student Senate, Virginia Tech.

2022
- Modern Programming in Genome to Phenome Scholarship ($1500), University of California, Davis, CA, August 1-5.
- 27th Summer Institute in Statistical Genetics (SISG) Scholarship, University of Washington, Seattle, WA, July 18-27.

2020
- UC Davis Henry A. Jastro Graduate Research Awards
- UC Davis Animal Biology Graduate Program Fellowship

2016
- Academic Scholarship of Chinese Academy of Agricultural Sciences

2015
- Academic Scholarship of Chinese Academy of Agricultural Sciences
- Course Excellence Award of Chinese Academy of Agricultural Sciences

2014
- Academic Scholarship of Chinese Academy of Agricultural Sciences
- Outstanding Graduate of Shandong Agricultural University

2013
- Excellent Student Scholarship of Shandong Agricultural University
- Science and Technology Innovation Scholarship of Shandong Agricultural University

2012
- Excellent Student Scholarship of Shandong Agricultural University

2011
- Excellent Student Scholarship of Shandong Agricultural University

Activity

- Virginia Tech Center for Advanced Innovation in Agriculture(CAIA) Graduate Student Affiliate Group Member **October/2021 - present**
- The 10th National Congress of Animal Nutrition Branch of Chinese Association of Animal Science and Veterinary Medicine (CAAV) and the 12th Animal Nutrition Symposium member **October/2016 - September/2017**
- The XXV World's Poultry Congress member **September/2016 - August/2017**
- The Branch of Animal Information, Chinese Association of Animal Science and Veterinary Medicine the 10th Symposium member **July/2015 - June/2016**

Courses taken

Virginia Polytechnic Institute and State University

- ECE 6554 Advanced Computer Vision
- CS 5824 Advanced Machine Learning
- ECE 6524 Deep Learning
- ECE 5554 Computer Vision
- CS 5525 Data Analytics I
- STAT 5364G Advanced Statistical Genomics
- ALS 5224 Introduction to Genomic Data Science
- HORT 5304 Advanced Plant Genetics and Breeding

University of California Davis

- STA 200B Introduction to Mathematical Statistics I
- GGG 201A Advanced Genetic Analysis
- STA 200A Introduction to Probability Theory
- PMI 270 Advanced Immunology
- PMI 126 Fundamentals of Immunology

- STA 106 Applied Statistical Methods: Analysis of Variance
- PLS 120 Applied Statistics in Agricultural Sciences

Additional Training

- Modern Programming in Genome to Phenome, University of California, Davis, CA, August 1-5, 2022.
- 27th Summer Institute in Statistical Genetics (SISG), University of Washington, Seattle, WA, July 18-27, 2022.
- UIUC Spring Workshop: Applied Quantitative Genetics for Plant Breeders, University of Illinois Urbana-Champaign, Urbana, IL, June 1-3, 2022.

Computer Skills

- Statistics/Numerical computational tools: R, SAS
- Computer vision and image processing: Python, MATLAB
- Content-description languages: LaTeX
- Operating system: Linux and Mac OS X
- Computer clusters: Slurm workload manager

References

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