Curriculum Vitae – Mingsi Liao

Last updated: Sep 20, 2025

Mingsi Liao (廖铭思)

Address: 2560 Litton-Reaves Hall,
Blacksburg, VA 24061
Email: msliao@vt.edu
Web page: mingsiliao.github.io/mingsi.github.io//

RESEARCH INTERESTS

1. Genomics & Sequencing Technologies (Next generation sequencing/Metatranscriptomic/Whole genome sequencing)
2. Artificial intelligence (Machine learning/Deep learning/Computer vision)

EDUCATION

2022-present	**Ph.D.** Genetics, Bioinformatics and Computational Biology School of Animal Sciences Virginia Polytechnic Institute and State University **Thesis**: Integration of early dietary supplementation and automated feeding systems to mitigate postweaning slump in dairy heifers & Use of precision technology to predict pathogenic diarrhea in pre-weaned dairy heifers. Advisor: Dr. Rebecca Cockrum (Chair), Dr. Gota, Morota, Dr. Christina Petersson-Wolfe, Dr. Chris Thomas
2025 - present	**MEng** Computer Science & Application Department of Computer Science
2019 - 2021	**M.S.** Bioinformatics and Computational Biology School of System Biology George Mason University **Project & Report (Non-thesis)**: Genomic and bioinformatic analyses of an ocular pathogen that molecularly types as a respiratory pathogen Advisor: Dr. Don Seto
2013-2017	**B.S.** Biotechnology School of Materials Science and Food Engineering University of Electronic Science and Technology of China, Zhongshan Institute (Rank: 1th) **Capstone project:** Exploitation and development of natural pigment of black olive Advisor: Dr. Lin Li

SKILLS & CETIFICATES

Laboratory skills and animal handling (dairy calf)

- DNA extraction
- Serum spinning
- Blood sample collection (Jugular venipuncture)

Curriculum Vitae – Mingsi Liao

- Fecal sample collection
- Oral sample collection

Bioinformatics & Genomic Analysis

- NGS (FastQC, MultiQC, Trimmomatic, STAR, BWA, FeatureCounts, VCFtools, bcftools, samtools)
- GWAS (PLINK, Beagle, GEMMA)
- Metatranscriptomic (SortMeRNA, MEGAHIT, Kraken)
- Variants calling and annotation (GATK, freeBayes, delly, SnpEFF, VEP)
- Data type (RNA-seq, WGS, Metatranscriptomic/Metagenome, Genotype Data)

Computational skills

- Operating systems (Linux, Windows, macOS)
- Deep learning/Machine learning (CNNs, Transfer Learning, Regression Models, Clustering, Transformer)
- Computer vision (thresholding segmentation, OpenCV)
- Programming & Scripting: (Python, R, Bash/Shell, LaTeX)

Certifications

- Graduate Certificate in Data Analytics, USA
- Institutional Animal Care and Use Committee (IACUC) Training Certificate, USA
- Public Nutritionist (Level Three), China

Soft skills

- Leadership (mentored and coordinated 20 undergraduate students in research projects)
- Grant writing
- Teamwork
- Problem-solving
- Adaptability

EXPERIENCE

Work Experience

2022-present **Research Assistant**

Virginia Polytechnic Institute and State University, Blacksburg, VA 24061

- Contributed to the design and development of research projects in collaboration with principal investigators.
- Assisted in literature reviews, data collection, and analysis to support research objectives.
- Played a key role in writing and preparing IACUC protocols and applications, ensuring compliance with regulatory standards and ethical guidelines.
- Implemented data management protocols and maintained accurate records of experimental procedures and results.
- Participated in team meetings and discussions to brainstorm ideas, troubleshoot challenges, and evaluate research outcomes.
- Communicated research findings through presentations, reports, and publications, contributing to the dissemination of scientific knowledge.
- Collaborated with interdisciplinary teams to facilitate research collaborations and enhance project outcomes.

2020-2021 **Graduate Researcher**

George Mason University, Fairfax, VA

Research Title: Genomic and Bioinformatic Analyses of an Ocular Pathogen

that Molecularly Types as a Respiratory Pathogen

2016 (Summer) **Drug Production Supervisor (Internship)**
Guangdong Tenchance Veterinary Pharmaceutical Corp, Pharmaceutical Production Department, Zhongshan, Guangdong Province, China

Professional Experience

2023-present **Project Team Leader**
Virginia Polytechnic Institute and State University, Blacksburg, VA 24061
- Led and supervised a team of undergraduate researchers for projects.
- Oversaw recruitment, task assignment, and training initiatives.
- Facilitated communication and collaboration within the team.

2022 (Fall)& 2023 (Fall)& 2024 (Fall) **Teaching Assistant**
Virginia Polytechnic Institute and State University, Blacksburg, VA 24061
Course: Animal Breeding and Genetics 3104
- Managed undergraduate teaching assistants and scheduled office hours.
- Addressed student questions related to coursework and assignments.
- Assisted the instructor with grading exams.

Research

2024-present **Estimation of Weaning Age in Dairy Heifers Using Precision Technologies**
Virginia Polytechnic Institute and State University, Blacksburg, VA
- Estimation of weaning age leverages precision feeding and monitoring data to determine the optimal time for transitioning dairy heifers.

2024-present **Prediction of Diarrhea in Pre-Weaned Dairy Heifers Through Advanced Monitoring Systems**
Virginia Polytechnic Institute and State University, Blacksburg, VA
- Prediction of diarrhea focuses on identifying pathogenic cases in pre-weaned dairy heifers using advanced diagnostic technologies to detect issues before symptoms appear in the system, enabling early intervention.

2024-present **Investigation of Early Lactose Exposure on Dairy Calf Development**
Virginia Polytechnic Institute and State University, Blacksburg, VA
- Analysis of growth, health, and metabolic differences in dairy calves resulting from early lactose exposure, comparing calves fed with and without lactose during the first 3 days and monitored from day 0 to weaning.

2023-present **Diarrhea Identification in Dairy Holstein Calves using Machine Learning Model**
Virginia Polytechnic Institute and State University, Blacksburg, VA
- Development of a predictive machine learning model for diarrhea detection through image processing techniques.

2023-2024 **Automatically Videos Collection and Prediction of Calf Body Weight using a Depth Camera**
Virginia Polytechnic Institute and State University, Blacksburg, VA
- Modification of an existing system to create an automated, hands-free solution for predicting dairy calf weights, combining top-view video

recordings from a depth camera, electronic weighing scales, and contour extraction to measure calf dimensions, with a machine learning model that utilizes video-derived measurements and weight data.

2024-present **Whole Genome Sequencing (WGS) Analysis for Breed Differentiation (Royal White vs. White Dorper)**

Virginia Polytechnic Institute and State University, Blacksburg, VA

- Identification of breed-specific genetic variation by analyzing high-quality SNPs and indels, assessing population structure, and revealing key genetic differentiation between Royal White and White Dorper breeds.

2022-2023 **Genetic Association Analysis in Ovine Johne's Disease**

Virginia Polytechnic Institute and State University, Blacksburg, VA

- Investigation of SNP associations with disease phenotypes in sheep using genotypic data from the Ovine SNP50 BeadChip, with quality control to exclude low-call-rate SNPs and individuals, imputation of missing genotypes via Beagle, and logistic regression analysis to identify disease-associated genetic variants.

2022-present **Metatranscriptomics Reveals Functional Profiles of Rumen Microbial Ecosystem in Dairy Cows**

Virginia Polytechnic Institute and State University, Blacksburg, VA

- Characterization of rumen microbiome by aligning RNA reads to the NCBI-nr database, revealing the abundance and functional roles of bacteria, fungi, archaea, and protozoa.

2021 **Genomic and Bioinformatic Analyses of an Ocular Pathogen that Molecularly Types as a Respiratory Pathogen (Master's Project & Report)**

George Mason University, Fairfax, VA

- Analysis of a novel pathogen using bioinformatics workflows, including BLAST, annotation, phylogenetic analysis, genome comparison, and recombination analysis, demonstrating recombination from known human adenoviruses.

2017 **Exploitation and Development of Natural Pigment of Black Olive (Bachelor's Capstone Study)**

University of Electronic Science and Technology of China, Zhongshan Institute, Zhongshan, Guangdong Province, China

- Investigation of black olive pigments by extracting polyphenols and anthocyanins from skin and pulp, optimizing extraction conditions, and assessing pigment stability under heat, oxidation, and reduction, along with the effects of various additives and metal ions.

Conference/Presentations

2025 **Liao, M.** "Genome-Wide Characterization of SNPs and Indels in Royal White and White Dorper Sheep Using Whole-Genome Sequencing". American Society of Animal Science (ASAS) conference. Hollywood, Florida

Poster presentation

2025 **Liao, M.** "Genome-Wide Characterization of SNPs and Indels in Royal White and White Dorper Sheep Using Whole-Genome Sequencing". Research Day, School of Animal Science, Virginia Tech, Blacksburg, Virginia

Rapid Fire Talks

Curriculum Vitae – Mingsi Liao

2025	**Liao, M.** "Predicting Dairy Calf Body Weight from Depth Images Using Deep Learning (YOLOv8) and Threshold Segmentation with Cross-Validation and Longitudinal Analysis." Graduate and Professional Student Senate (GPSS) 41st Annual Research Symposium and Exposition Poster presentation
2025	**Liao, M.** "Predicting Dairy Calf Body Weight from Depth Images Using Deep Learning (YOLOv8) and Threshold Segmentation with Cross-Validation and Longitudinal Analysis." Genetic, Bioinformatics and Computational Biology seminar, Virginia Tech, Blacksburg, Virginia. Oral presentation
2025	**Liao, M.** "Predicting Dairy Calf Body Weight from Depth Images Using Deep Learning (YOLOv8) and Threshold Segmentation with Cross-Validation and Longitudinal Analysis." Center for Advanced Innovation in Agriculture Big Event, Blacksburg, Virginia Poster presentation
2025	**Liao, M.** "Comparison of Deep Learning (YOLOv8) and Threshold-Based Methods for Depth Image Segmentation using Extreme Gradient Boosting to Predict Dairy Calf Body Weight." The Plant and Animal Genome Conference (PAG), San Diego, California Poster presentation
2024	**Liao, M.** "Dietary Crude Protein is Independent of Rumen Microbial Community Ecology in Lactating Dairy Cows." American Dairy Science Association (ADSA), West Palm Beach, Florida. Poster presentation
2024	**Liao, M.** "Dairy Calf Health and Growth Monitoring through Camera Phenotyping Techniques. American Dairy Science Association." American Dairy Science Association (ADSA), West Palm Beach, Florida. Oral Presentation
2024	**Liao, M.** "Camera-Based Monitoring of Dairy Calf Health and Growth: Phenotyping Techniques Applied" Research Day, School of Animal Science, Virginia Tech, Blacksburg, Virginia Oral Presentation
2024	**Liao, M.** "Colostrum Quality: Management and Storage for Healthy Calves" Dairy Science Seminar, Virginia Tech, Blacksburg, Virginia Oral Presentation
2024	**Liao, M**. "Dietary Crude Protein is Independent of Rumen Microbial Community Ecology in Lactating Dairy Cows". 40th Annual Graduate and Professional Student Senate (GPSS) Research Symposium, Blacksburg, Virginia Poster presentation
2024	**Liao, M.** "Dairy Calf Health and Growth Monitoring through Camera Phenotyping Techniques. American Dairy Science Association." Center for Advanced Innovation in Agriculture Big Event, Blacksburg, Virginia Oral Presentation
2024	**Liao, M** and Cockrum, R. "Work in progress: Dairy Calf Health and Performance – Research Impact and Future Direction" Reproductive Biology Club, School of Animal Science, Virginia Tech Oral Presentation

Curriculum Vitae – Mingsi Liao

2023 **Liao, M.** and McGehee, J. "Work in progress: Unveiling the Mysteries of the Dairy Cow Rumen: Microbial Composition and Function." Reproductive Biology Club, School of Animal Science, Virginia Tech, Blacksburg, Virginia
Oral Presentation

2023 **Liao, M** "Shotgun Metatranscriptomics Reveals Functional Profiles of Rumen Microbial Ecosystem in Dairy Cows" Research Day, School of Animal Science, Virginia Tech, Blacksburg, Virginia
Oral Presentation

Research & Academic Contributions

2024/3 **Abstract Reviewer**
2024 Graduate and Professional Student Senate (GPSS) Research Symposium

- Evaluated abstract submissions based on clarity, relevance, and adherence to guidelines.
- Provided feedback to authors aimed at improving the quality and impact of their submissions.
- Collaborated with peers and organizers to select top-quality abstracts for presentation.

Volunteer Experience

2018 **Blood Tester**
Puning People's Hospital, Puning, Guangdong Province, China

2021 **Tutor** (Teaching Chinese, Human Anatomy), Remote

PUBLICATIONS

Manuscript under review

present **Liao, M**., Kravitz, A., R., Cockrum, R. and Sriranganathan, N., 2025. Whole Genome Sequencing Analysis for Breed Differentiation between Royal White and White Dorper.

Peer-reviewed articles

2025 **Liao, M**., Morota, G., Bi, Y., & Cockrum, R. R. (2025). PredictingDairy Calf Body Weight from Depth Images Using Deep Learning (YOLOv8) and Threshold Segmentation with Cross-Validation and Longitudinal Analysis. Animals, 15(6), 868. https://doi.org/10.3390/ani15060868

2024 Kravitz, A., **Liao, M**., Morota, G., Tyler, R., Cockrum, R., Manohar, B.M., Ronald, B.S.M., Collins, M.T. and Sriranganathan, N., 2024. Retrospective Single Nucleotide Polymorphism Analysis of Host Resistance and Susceptibility to Ovine Johne's Disease Using Restored FFPE DNA. *International Journal of Molecular Sciences*, *25*(14), p.7748.

Popular Press

2024 **Liao, M.** & Cockrum, R. (2024). Colostrum Management and Storage for Healthy Calves. Virginia Cooperative Extension: Dairy Pipeline, 45(7), DASC-171NP.

AWARDS/GRANT

2025	National Research Support Project (NRSP-8) fellowship grant, USA
2025	Center for Advanced Innovation in Agriculture (CALS) travel award, USA
2024	Graduate and Professional Student Senate (GPSS) Research Symposium: 2nd Place Award in Poster Presentation, USA
2024	Virginia Tech School of Animal Sciences Research Symposium Travel Award, USA
2023	Virginia Tech School of Animal Sciences Research Symposium Travel Award, USA
2022-2024	John Lee Pratt Animal Nutrition Scholarship, USA
2016	2nd Place Institutional Scholarship, China
2016	Honorable Mention of Cultural New Media Creative Competition, China
2014/2015	1st Place Institutional Scholarship, China
2015	Excellent League Member, China
2014	Food Safety Publicity Competition (3rd Place), China

GRADUATE COURSEWORK

Ph.D. & MEng	CS 5024 Ethics & Professionalism in CS
	CS 5040 Intermed Data Struct/Algorithm
	CS 5984 SS: Engineer Entrepreneurship
	CS 5525 Data Analytics
	CS 5806 Machine Learning II
	CS 5814 Deep learning
	ECE 5554 Computer Vision
	STAT 5615 Statistics in Research
	STS 5444 Issues in Bioethics
	GBCB 5874 Problem Solving in Genetics, Bioinformatics, and Computational Biology
M.S.	BINF 630 Bioinformatics Methods
	BINF 631 Molecular Cell Biology
	BINF 633 Molecular Biotechnology
	BINF 634 Bioinformatics Programming
	BINF 701 Systems Biology
	BINF 702 Biological Data Analysis
	BINF 731 Protein Structure Analysis
	BINF 739 Next Generation Sequencing
	BINF 739 Comp Analysis Viral Genomes
	BIOL 695 Coronavirus Research Update

LANGUAGES

Mandarin	1st language
English	2nd language
Teochew	1st language
Cantonese	Basic conversational and listening proficiency