



AUBURN
UNIVERSITY

Mehdi Momen, Ph.D.

Assistant Professor of
Computational and Functional Genomics

Department of Poultry Science · College of Agriculture · Auburn University

Curriculum Vitae – Updated October 2026

CONTACT INFORMATION

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RESEARCH INTERESTS

My research program in computational and functional genomics aims to understand and improve the health, resilience, and productivity of poultry. I develop and apply statistical, quantitative-genetic, and artificial intelligence/machine learning (AI/ML) methods that integrate genomic, transcriptomic, epigenomic, and high-throughput phenotypic data to dissect the genetic architecture of complex traits. Current areas of focus include genomic prediction and selection, genotype-by-environment interaction, heat-stress resilience, transgenerational epigenetic inheritance, and multi-omics and causal network modeling. Building on interdisciplinary experience across livestock, companion animal, and human data, my goal is to translate genomic discoveries into practical tools for poultry breeding and precision production, while training the next generation of computational scientists in animal agriculture.

2012 – 2017

Ph.D.: Animal Breeding and Quantitative Genetics

Shahid Bahonar University of Kerman (SBUK), Kerman, Iran

- **Dissertation:** Predictive ability and sensitivity of whole-genome prediction (WGP) machine learning models for genomic selection in complex traits with additive, dominance, and epistatic genetic architectures.
- **Advisors:** Ahmad Ayatollahi Mehrgardi and Ali Esmailizadeh

2015 – 2016

Visiting Ph.D. Scholar: Quantitative and Statistical Genetics

University of Wisconsin–Madison, Madison, WI, USA

- **Project:** Development and predictive assessment of whole-genome prediction algorithms for genomic selection and genome-wide association studies.
- **Advisors:** Daniel Gianola and Guilherme J. M. Rosa

2007 – 2010

M.Sc.: Animal Breeding and Quantitative Genetics

University of Tehran, Tehran, Iran

- **Thesis:** Modeling genetic analysis of reproductive and growth traits in animals.
- **Advisor:** Nasser Emam-Jomeh Kashan

2003 – 2007

B.Sc.: Animal Science

College of Agriculture, University of Zabol, Sistan and Baluchestan, Iran

PROFESSIONAL EXPERIENCE

Assistant Professor: Computational and Functional
Genomics in Poultry

August 2026 – Present

Department of Poultry Science, Auburn University, Auburn, AL, USA

2023 – July 2026

Assistant Scientist: Computational Biology
University of Wisconsin–Madison, Madison, WI, USA

- **Supervisor:** Peter Muir

Postdoctoral Trainee: Computation and Informatics in Biology and
Medicine (CIBM)
University of Wisconsin–Madison, Madison, WI, USA

2021 – 2023

- **Advisor:** Peter Muir **Program Director:** Mark W. Craven

Postdoctoral Research Associate: Bioinformatics and
Computational Genetics
University of Wisconsin–Madison, Madison, WI, USA

2019 – 2021

- **Advisor:** Peter Muir

Postdoctoral Research Associate: Statistical and Quantitative
Genetics
Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA,
USA

2018 – 2019

- **Advisor:** Gota Morota

Research Assistant: Animal Genetics and Genomics
Shahid Bahonar University of Kerman (SBUK), Kerman, Iran

2017 – 2018

- **Supervisors:** Ahmad Ayatollahi Mehrgardi and Ali Esmailzadeh

AWARDS

2021-2022: Traineeship awarded by Computation and Informatics in Biology
and Medicine (CIBM), University of Wisconsin-Madison.

2015-2016: Visitor student awarded with high honors, to do research at Univer-
sity of Wisconsin-Madison.

PUBLICATIONS

Peer-Reviewed Journal Articles

1. **Mehdi Momen**, Faris Hazim Mohamed Zaimir, Brian W. Davis, Susannah J. Sample, Peter Muir. **2026**. Influence of homozygosity on genomic structural variation analyses for predicting ACL rupture risk in the Labrador Retriever and Rottweiler. *Frontiers in Genetics*, 17:1875383.
doi: 10.3389/fgene.2026.1875383
2. Rana Arabzadeh Madanipour, Mohammadreza Mohammadabadi, Mohammad Salarmoini, Amin Khezri, Olena Babenko, Iryna Tytarenko, Oleksandr Kalashnyk, Viktor Slynko, Svitlana Usenko, **Mehdi Momen**. **2026**. Effect of emulsifier supplementation on UCP3 gene expression in different tissues of broiler chickens. *Agricultural Biotechnology Journal*.
doi: 10.22103/jab.2026.27816.1995

3. **Mehdi Momen**, Hannah Kearney, Margaret Patterson, Susannah J. Sample, Zijie Zhao, Stuart K. Kim, Qiongshi Lu, Guilherme J. M. Rosa, Peter Muir. **2025**. Cross-species analysis of genetic architecture and polygenic risk scores for non-contact ACL rupture in dogs and humans. *Communications Biology*. doi: 10.1038/s42003-024-07395-9
4. Moslem Moghbeli, Ahmad Ayatollahi Mehrgardi, Ali Esmailizadeh, **Mehdi Momen**. **2025**. Fine-scale assessment of ROH patterns and genomic inbreeding in diverse horse breeds using two SNP array densities. *BMC Veterinary Research*.
5. Benjamin Miranda, **Mehdi Momen**, Susannah J. Sample, Peter Muir. **2025**. Accuracy of genome-enabled polygenic risk score prediction of cruciate ligament rupture risk in the Labrador Retriever. *Frontiers in Veterinary Science*. doi: 10.3389/fvets.2025.1625953
6. Mahmoud Amiri Roudbar, Seyedeh Fatemeh Mousavi, Mahdi Akbarzadeh, Sabrina Brounts, **Mehdi Momen**. **2025**. Pairwise paternity assignment with forward-backward simulations: Refining CERVUS using trio-based likelihood and locus-specific error rates. *Ecology and Evolution*. doi: 10.1002/ece3.72230
7. Mohammadreza Mohammadabadi, Amin Khezri, Mohsen Afsharmanesh, Hamid Kheyroodin, Mohammad Reza Bahreini Behzadi, Olena Babenko, Svitlana Usenko, **Mehdi Momen**. **2025**. Investigation of interleukin-6 gene expression in liver and spleen tissues of broiler chickens fed mealworm, probiotics, and mealworm with probiotics. *Agricultural Biotechnology Journal*. doi: 10.22103/jab.2025.26228.1793
8. Mina Jahangiri, Anoshirvan Kazemnejad, Keith S. Goldfeld, Maryam S. Daneshpour, **Mehdi Momen**, Shayan Mostafaei, Davood Khalili, Mahdi Akbarzadeh. **2025**. Leveraging mixed-effects regression trees for analysis of high-dimensional longitudinal data: A simulation study with application to genetic data. *BioData Mining*. doi: 10.1186/s13040-025-00437-w
9. **Mehdi Momen**, Peter Muir. **2025**. Polygenic risk score prediction of complex diseases in companion animals: Prospects, opportunities and challenges. *American Journal of Veterinary Research*. doi: 10.2460/ajvr.25.01.0018
10. Siavash Manzoori, Rasoul Vaez Torshizi, Ali Akbar Masoudi, **Mehdi Momen**. **2025**. Novel candidate genes detection using Bayesian network-based genome-wide association study of latent traits in F2 chicken population. *Journal of Animal Breeding and Genetics*. doi: 10.1111/jbg.12926
11. Mohammadreza Mohammadabadi, Mahmoud Amiri Roudbar, Moslem Momen, Seyedeh Fatemeh Mousavi, **Mehdi Momen**. **2025**. Exploring methane emission dynamics using Bayesian networks and machine learning analysis of nutritional and production traits in dairy cattle. *Methane*, 4(3):21. doi: 10.3390/methane4030021
12. Morteza Mokhtari, Ali Esmailizadeh, **Mehdi Momen**, Rugang Tian, Jing Tian, Meng Zhao, Xiao Wang, Hui Li, Yuan Li, Alireza Bagheripour, Ehsan Moheb-binejad. **2025**. Inferring causal relationships for lifetime reproductive traits and modelling latent reproductive performance variable in Murciano-Granadina goats. *Journal of Animal Breeding and Genetics*. doi: 10.1111/jbg.12928

13. Teagan L. DeForge, **Mehdi Momen**, Gabi Conidi, Peter Muir, Susannah J. Sample. **2024**. Age of neutering contributes to risk of cruciate ligament rupture in Labrador Retrievers. *Journal of the American Veterinary Medical Association*. doi: 10.2460/javma.24.06.0406
14. Maryam Mahmoodi, Ahmad Ayatollahi Mehrgardi, **Mehdi Momen**, James A. Serpell, Ali Esmailizadeh. **2024**. Deciphering the genetic basis of behavioral traits in dogs: Observed-trait GWAS and latent-trait GWAS analysis reveal key genes and variants. *The Veterinary Journal*. doi: 10.1016/j.tvjl.2024.106251
15. Jacquelyn H. Perino, Margaret Patterson, **Mehdi Momen**, Mina Borisova, Amanda Heslegrave, Henrik Zetterberg, Jordan Gruel, Emily E. Binversie, Ryan S. Anderson, Helena Rylander, Starr Cameron, Benjamin Miranda, Gabi Conidi, John Svaren, Susannah J. Sample. **2024**. Neurofilament light chain concentration does not correlate with disease status in Labrador Retrievers affected with idiopathic laryngeal paralysis. *American Journal of Veterinary Research*. doi: 10.2460/ajvr.23.12.0292
16. Anderson RS, Chu AK, Rylander H, Binversie EE, Duncan I, Salamat S, Patterson MM, Gruel J, Kohler NL, Kearney HK, **Mehdi Momen**, Muir P, Svaren J, Johnson R, Sample SJ. **2024**. Pathologic classification of a late onset peripheral neuropathy in the Labrador Retriever. *The Journal of Comparative Neurology*. doi: 10.1002/cne.25596
17. **Mehdi Momen**, Kiley Brauer, Margaret Patterson, Susannah J. Sample, Emily E. Binversie, Brian W. Davis, E. Gus Cothran, Guilherme J. M. Rosa, Sabrina H. Brounts, Peter Muir. **2023**. Genetic architecture and polygenic risk score prediction of degenerative suspensory ligament desmitis (DSLDD) in the Peruvian Horse. *Frontiers in Genetics*. doi: 10.3389/fgene.2023.1201628
18. Brooke T. Lee, Lauren A. Baker, **Mehdi Momen**, Hannah Terhaar, Emily E. Binversie, Susannah J. Sample, Peter Muir. **2023**. Identification of genetic variants associated with anterior cruciate ligament rupture and coat color in the Labrador Retriever. *BMC Genomic Data*. doi: 10.1186/s12863-023-01164-z
19. Elahe Sanjari Banestani, Ali Esmailizadeh, **Mehdi Momen**, Ahmad Ayatollahi Mehrgardi, Morteza Mokhtari. **2023**. Genome-wide association study identifies significant SNP and related genes associated with body size in Yorkshire pigs using latent variable modelling. *The Journal of Agricultural Science*. doi: 10.1017/S0021859623000424
20. Masoud Alipanah, Zahra Roudbari, **Mehdi Momen**, Ali Esmailizadeh. **2023**. Impact of inclusion of non-additive effects on genome-wide association and variance components in Scottish black sheep. *Animal Biotechnology*, 1–9. doi: 10.1080/10495398.2023.2224845
21. Elahe Sanjari Banestani, Ali Esmailizadeh, **Mehdi Momen**, Ahmad Ayatollahi Mehrgardi, Morteza Mokhtari. **2023**. The accuracy of breeding values for body size latent trait in pigs under different prediction models. *Journal of Livestock Science and Technologies*, 11(1):61–67. doi: 10.22103/JLST.2023.20894.1454
22. Matheus Massariol Suela, Camila Ferreira Azevedo, Ana Carolina Campana Nascimento, **Mehdi Momen**, Eveline Teixeira Caixeta, Gota Morota, Moysés Nascimento. **2023**. Genome-wide association study for morphological, physiological,

- and productive traits in *Coffea arabica* using structural equation models. *Tree Genetics & Genomes*.
doi: 10.1007/s11295-023-01597-8
23. Emily E. Binversie, **Mehdi Momen**, Guilherme J. M. Rosa, Brian W. Davis, Peter Muir. **2022**. Across-breed genetic investigation of canine hip dysplasia, elbow dysplasia, and anterior cruciate ligament rupture using whole-genome sequencing. *Frontiers in Genetics*.
doi: 10.3389/fgene.2022.913354
 24. Francisco Jose de Novais, Aline Silva Mello Cesar, Haipeng Yu, Mirele Daiana Poleti, **Mehdi Momen**, Bruna Petry, Gerson Barreto Mourão, Luciana Correia de Almeida Regitano, Gota Morota, Luiz Lehmann Coutinho. **2022**. Multi-omic data integration for the study of production, carcass, and meat quality traits in Nellore cattle. *Frontiers in Genetics*.
doi: 10.3389/fgene.2022.948240
 25. **Mehdi Momen**, Guilherme J. M. Rosa, Sabrina Brounts, Emily E. Binversie, Susannah Sample, Brian W. Davis, Peter Muir. **2022**. Selection signature analyses and genome-wide association reveal several hotspot regions for degenerative suspensory ligament desmitis (DSLDD) in horse. *G3: Genes | Genomes | Genetics*.
doi: 10.1093/g3journal/jkac179
 26. Mahshid Mohammadpanah, Ahmad Ayatollahi Mehrgardi, Hélène Gilbert, Catherine Larzul, Marie-José Mercat, Ali Esmailizadeh, **Mehdi Momen**, Llibertat Tusell. **2022**. Genic and non-genic SNP contributions to additive and dominance genetic effects in purebred and crossbred pig traits. *Scientific Reports*.
doi: 10.1038/s41598-022-07767-3
 27. **Mehdi Momen**, Nyah L. Kohler, Emily E. Binversie, Mariellen Dentino, Susannah Sample. **2021**. Heritability and genetic variance estimation of osteosarcoma (OSA) in Irish Wolfhound, using deep pedigree information. *Canine Medicine and Genetics*.
doi: 10.1186/s40575-021-00109-y
 28. **Mehdi Momen**, Andreas Kranis, Guilherme J. M. Rosa, Peter Muir, Daniel Gianola. **2021**. Predictive assessment of single-step BLUP with linear and non-linear similarity RKHS kernels: A case study in chickens. *Journal of Animal Breeding and Genetics*.
doi: 10.1111/jbg.12665
 29. Mahmoud Amiri Roudbar, Seyedeh Fatemeh Mousavi, Siavash Salek Ardestani, Fernando Brito Lopes, **Mehdi Momen**, Daniel Gianola, Hasan Khatib. **2021**. Prediction of biological age and evaluation of genome-wide dynamic methylomic changes throughout human aging. *G3: Genes | Genomes | Genetics*.
doi: 10.1093/g3journal/jkab112
 30. Karim Nobari, Mahmoud Vatankhah, Sayed Davood Sharifi, Nasser Emam Jomeh Kashan, **Mehdi Momen**, Abdollah Kavian. **2021**. Comparison of artificial neural network and multiple linear models in estimation of fat-tail weight on fat-tailed breeds and their crosses. *Animal Sciences Journal*, 33(129):167–182.
doi: 10.22092/ASJ.2020.128001.2003
 31. Lauren A. Baker, **Mehdi Momen**, Rachel McNally, Mark Berres, Emily E. Binversie, Susannah J. Sample, Peter Muir. **2021**. Biologically enhanced genome-wide association study provides further evidence for candidate loci and discovers novel loci that influence risk of anterior cruciate ligament rupture in the dog model.

32. **Mehdi Momen**, Madhav Bhatta, Waseem Hussain, Haipeng Yu, Gota Morota. **2021**. Modeling multiple phenotypes in wheat using data-driven genomic exploratory factor analysis and Bayesian network learning. *Plant Direct*, 5(1):e00304. doi: 10.1002/pld3.304
33. Jacquelyn Perino, Margaret Patterson, **Mehdi Momen**, Mina Borisova, Amanda Heslegrave, Henrik Zetterberg, Jordan Gruel, Emily Binversie, Lauren Baker, Alexander Rossor, John Svaren, Susannah J. Sample. **2021**. Neurofilament light plasma concentrations associate with age in the dog. *Neuroscience Letters*, 744:135593. doi: 10.1016/j.neulet.2020.135593
34. Sirous Eydivandi, Mahmood Amiri, Siavash Salek Ardestani, **Mehdi Momen**, Goutam Sahana. **2021**. A selection signatures study between Middle Eastern and European sheep breeds. *Journal of Animal Breeding and Genetics*. doi: 10.1111/jbg.12536
35. Karim Nobari, Sayed Davood Sharifi, Nasser Emam Jomeh Kashan, **Mehdi Momen**, Abdollah Kaviani. **2021**. Performance of artificial neural networks model under various structures and algorithms to prediction of fat tail weight in fat-tailed breeds and their thin-tailed crosses. *Iranian Journal of Applied Animal Science*, 11(4). doi: 10.1001.1.2251628.2021.11.4.12.0
36. Sabrina T. Amorim, Haipeng Yu, **Mehdi Momen**, Lucia Galvão de Albuquerque, Angelica S. Cravo Pereira, Fernando Baldi, Gota Morota. **2020**. An assessment of genomic connectedness measures in Nellore cattle. *Journal of Animal Science*, 98(11):skaa289. doi: 10.1093/jas/skaa289
37. Eydivandi S, Sahana G, **Mehdi Momen**, Moradi MH, Schönherz AA. **2020**. Genetic diversity in Iranian indigenous sheep vis-à-vis selected exogenous sheep breeds and wild Mouflon. *Animal Genetics*, 51(5):772–787. doi: 10.1111/age.12985
38. Lauren A. Baker, **Mehdi Momen**, Kore Chan, Fernando Brito Lopes, Nathan Bollig, Rory J. Todhunter, Guilherme J. M. Rosa, Emily E. Binversie, Susannah J. Sample, Peter Muir. **2020**. Bayesian and machine learning models for genomic prediction of anterior cruciate ligament rupture in the canine model. *G3: Genes | Genomes | Genetics*. doi: 10.1534/g3.120.401244
39. Sara Pegolo, **Mehdi Momen**, Gota Morota, Guilherme J. M. Rosa, Daniel Gianola, Giovanni Bittante, Alessio Cecchinato. **2020**. Structural equation modeling for investigating multi-trait genetic architecture of udder health in dairy cattle. *Scientific Reports*. doi: 10.1038/s41598-020-64575-3
40. Amiri Roudbar M, Mohammadabadi MR, Ayatollahi Mehrgardi A, Abdollahi-Arpanahi R, **Mehdi Momen**, Morota G, Brito Lopes F, Gianola D, Rosa GJM. **2020**. Integration of single nucleotide variants and whole-genome DNA methylation profiles for classification of rheumatoid arthritis cases from controls. *Heredity*. doi: 10.1038/s41437-020-0301-4
41. Samaneh Solaymani, Ahmad Ayatollahi Mehrgardi, Ali Esmailzadeh, Llibertat

- Tusell, **Mehdi Momen**. 2020. Performance of pedigree and various forms of marker-derived relationship coefficients in genomic prediction and their correlations. *Journal of Animal Breeding and Genetics*, 137(5):423–437.
doi: 10.1111/jbg.12467
42. Toshimi Baba, **Mehdi Momen**, Malachy T. Campbell, Harkamal Walia, Gota Morota. 2020. Multi-trait random regression models increase genomic prediction accuracy for a temporal physiological trait derived from high-throughput phenotyping. *PLoS ONE*, 15(2):e0228118.
doi: 10.1371/journal.pone.0228118
 43. **Mehdi Momen**, Malachy T. Campbell, Harkamal Walia, Gota Morota. 2019. Utilizing trait networks and structural equation models as tools to interpret multi-trait genome-wide association studies. *Plant Methods*, 15:107.
doi: 10.1186/s13007-019-0493-x
 44. **Mehdi Momen**, Malachy T. Campbell, Harkamal Walia, Gota Morota. 2019. Predicting longitudinal traits derived from high-throughput phenomics in contrasting environments using genomic Legendre polynomials and B-splines. *G3: Genes | Genomes | Genetics*, 9(10):3369–3380.
doi: 10.1534/g3.119.400346
 45. Malachy T. Campbell, **Mehdi Momen**, Harkamal Walia, Gota Morota. 2019. Leveraging breeding values obtained from random regression models for genetic inference of longitudinal traits. *The Plant Genome*, 12(2):180075.
doi: 10.3835/plantgenome2018.10.0075
 46. Fazel Y, Esmailizadeh A, **Mehdi Momen**, Assadi Foozi M. 2018. Importance of genotype by environment interaction on genetic analysis of milk yield in Iranian Holstein cows using random regression model. *Animal Production Science*.
doi: 10.1071/AN17714
 47. **Mehdi Momen**, Ahmad Ayatollahi Mehrgardi, Mahmoud Amiri Roudbar, Andreas Kranis, Renan Mercuri Pinto, Bruno D. Valente, Gota Morota, Guilherme J. M. Rosa, Daniel Gianola. 2018. Including phenotypic causal networks in genome-wide association studies using mixed effects structural equation models. *Frontiers in Genetics*, 9:455.
doi: 10.3389/fgene.2018.00455
 48. **Mehdi Momen**, Gota Morota. 2018. Quantifying genomic connectedness and prediction accuracy from additive and non-additive gene actions. *Genetics Selection Evolution*, 50(1).
doi: 10.1186/s12711-018-0415-9
 49. **Mehdi Momen**, Ahmad Ayatollahi Mehrgardi, Ayyub Sheikhy, Andreas Kranis, Llibertat Tusell, Gota Morota, Guilherme J. M. Rosa, Daniel Gianola. 2018. Predictive ability of genome-assisted prediction machines under various statistical genetic architectures. *Scientific Reports*, 8:12309.
doi: 10.1038/s41598-018-30089-2
 50. **Mehdi Momen**, Ahmad Ayatollahi Mehrgardi, Ayyub Sheikhy, Ali Esmailizadeh, Mohammad Assadi Foozi, Andreas Kranis, Bruno D. Valente, Guilherme J. M. Rosa, Daniel Gianola. 2017. A genome-enabled predictive assessment of genetic correlations between traits in chickens. *Genetics Selection Evolution*, 49:16.
doi: 10.1186/s12711-017-0290-9
 51. **Mehdi Momen**, Ahmad Ayatollahi Mehrgardi, Ayyub Sheikhy, Ali Esmailizadeh, Mohammad Assadi Foozi. 2016. Predictive ability of statistical genomic predic-

tion methods when underlying genetic architecture of trait is purely additive. *Iranian Journal of Applied Animal Science*, 6(4):815–822.
<https://sanad.iau.ir/Journal/ijas/Article/1024247>

52. **Mehdi Momen**, Nasser Emam Jomeh Kashan, Sayed Davood Sharifi, Mahmoud Amiri Roudbar, Ahmad Ayatollahi Mehrgardi. **2015**. Fatty acid composition of fat-tail and visceral fat depots from Chaal and Zandi pure lambs and their crosses with Zel. *Iranian Journal of Applied Animal Science*, 6(1):107–112.

Manuscripts Under Review

- R1. **Mehdi Momen**. Modeling zero-inflated phenotypes in the era of genomic prediction: a comparison of linear, threshold, and hurdle models in chickens. Under review, 2026.
- R2. **Mehdi Momen***, Andreas Kranis, Renan Mercuri Pinto. Single-step genomic prediction using distance-based kernel matrices for predicting egg production and body weight in broiler chickens. Under review, 2026.
- R3. **Mehdi Momen***, Rostam Abdollahi-Arpanahi, Andreas Kranis, Renan Mercuri Pinto. Improving genomic prediction accuracy of hen-house egg production (HHP) by integrating prior QTL annotation information. Under review, 2026.
- R4. Renan Mercuri Pinto, Fernando Brito Lopes, Bruno Dourado Valente, **Mehdi Momen**, Catherine W. Ernst, Guilherme J. M. Rosa. PolyMaGNet: a hybrid causal method for inferring putative phenotypic networks accounting for polygenic and major gene effects. Under review, 2026.
- R5. **Mehdi Momen**, Emily E. Binversie, Lauren A. Baker, Jordan Gruel, Margaret M. Patterson, Alex Chu, Ryan S. Anderson, Mark Berres, Nyah Kohler, Hannah Kearney, John Svaren, Peter Muir, Susannah J. Sample. Insights into axonal degeneration and age-related change from RNA sequencing of peripheral nerve in a canine model of peripheral neuropathy. Under review, *Frontiers in Neuroscience*.
- R6. Mahdi Akbarzadeh, Parisa Riahi, **Mehdi Momen**, Mehdi Hedayati, Mahmoud Amiri Roudbar, Said Rasekhi Dehkordi, Asiyeh Sadat Zahedi, Majid Ghasemy, Maryam S. Daneshpour. A review on applications of structural equation models in genome-wide association studies. Under review, *Machine Learning*.

Manuscripts in Preparation

- P1. **Mehdi Momen**, Hazim Bin Mohammad Izani, Peter Muir. Across-breed prediction of anterior cruciate ligament rupture in dogs using Bayesian, machine learning and deep learning algorithms: A comparative analysis of Labrador Retrievers and Rottweilers.
- P2. **Mehdi Momen**. ThreshGene: an R package for simulating and analyzing the genetic architecture of ordinal categorical diseases using frequentist and Bayesian methods.
- P3. **Mehdi Momen**, Soroush Irandoust, Susannah J. Sample, Peter Muir. Developing an automated AI framework for grading ACL rupture severity and stratifying risk scores using orthopedic X-ray images in three dog breeds.
- P4. **Mehdi Momen**, Susannah J. Sample, Guilherme J. M. Rosa, Peter Muir. Integrative genomic structural variation analyses and deep learning models for predicting ACL rupture risk across Labrador Retriever and Rottweiler dogs.

- P5. **Mehdi Momen**, Qiongshi Lu, Peter Muir. Polygenic risk scores for complex orthopedic diseases in companion animals within the artificial intelligence and machine learning paradigm: A review.
- P6. **Mehdi Momen**, Benjamin Miranda, Susannah J. Sample, Peter Muir. Accuracy of genome-enabled polygenic risk score prediction of cruciate ligament rupture in an independent Labrador Retriever set using Bayesian, machine learning and deep neural network methods.
- P7. **Mehdi Momen**, Adam Friedrich Hoerl, Sabrina H. Brounts, Susannah J. Sample, Peter Muir. Transcriptomic profile of equine tendon tissues in Peruvian horses at risk of degenerative suspensory ligament desmitis (DSLDD).
- P8. Ayyub Sheikhi, **Mehdi Momen**, Gota Morota. Prediction of time series with time-invariant covariates using recurrent neural networks.
- P9. Pedro Marcus Pereira Vidigal, **Mehdi Momen**, Paulo Mafra de Almeida Costa, Marcio Henrique Pereira Barbosa, Gota Morota, Luiz Alexandre Peternelli. A conditional REML algorithm for regional heritability mapping as a tool for screening sequence variation in the sugarcane genome.

Conference Proceedings and Abstracts

- C1. **Mehdi Momen**. **2026**. Development of a Bayesian probit mixture model for multi-ancestry risk score prediction of anterior cruciate ligament rupture in dogs. *Proceedings of the World Congress on Genetics Applied to Livestock Production (WCGALP)*.
Link
- C2. Anderson RS, Patterson M, Ale S, **Mehdi Momen**, Chu A, Corona A, Suzuki M, Svaren J, Sample SJ. **2025**. A naturally occurring canine model of peripheral neuropathy: genetic basis, transcriptomic profiling, and in vitro modeling through direct reprogramming. Society for Neuroscience Annual Meeting (Neuroscience 2025), San Diego, CA, November 15–19.
- C3. **Mehdi Momen**, Zhao Z, Lu Q, Rosa GJM, Kim SK, Muir P. **2024**. Polygenic risk score prediction of ACL rupture risk. Orthopaedic Research Society (ORS) Annual Meeting, Long Beach, CA, February 2–6.
- C4. **Mehdi Momen**, Wilson S, Patterson MM, Brounts SH, Muir P. **2023**. Genetic risk prediction of cruciate rupture. ACVS Surgery Summit, Louisville, KY, October 10–14.
- C5. **Mehdi Momen**, Wilson S, Patterson MM, Brounts SH, Muir P. **2023**. Genetics of DSLDD in the Peruvian Horse. ACVS Surgery Summit, Louisville, KY, October 10–14.
- C6. Anderson RS, **Mehdi Momen**, Binversie EE, Hao Z, Gruel J, Baker LA, Rylander H, Cameron S, Eminaga S, Barnes-Heller HL, Patterson M, Kohler N, Ale S, Wilson S, Stilin A, Kearney H, Svaren J, Muir P, Sample SJ. **2023**. Discovery of a novel structural variant associated with late-onset peripheral neuropathy in Labrador Retrievers. ACVS Surgery Summit, Louisville, KY, October 10–14.
- C7. Anderson RS, Chu AK, Rylander H, Binversie EE, Duncan I, Salamat S, Patterson MM, Gruel J, Kohler NL, Kearney HK, **Mehdi Momen**, Muir P, Svaren J, Johnson R, Sample SJ. **2023**. Pathologic classification of a late onset peripheral neuropathy in the Labrador Retriever. ACVS Surgery Summit, Louisville, KY, October 10–14.

- C8. **Mehdi Momen**, Lu Q, Rosa GJM, Muir P. **2023**. Risk genes for anterior cruciate ligament rupture are shared in human beings and dogs. ORS Annual Meeting, Dallas, TX, February 10–14.
- C9. **Mehdi Momen**, Lu Q, Rosa GJM, Muir P. **2023**. Genomic prediction of ACL rupture risk in dogs is influenced by ancestry. ORS Annual Meeting, Dallas, TX, February 10–14.
- C10. **Mehdi Momen**, Kohler NL, Brauer KJ, Brounts SH, Muir P. **2022**. Selection signature analysis of spontaneous equine degenerative tendon/ligament injury. NLM Informatics Training Conference, University at Buffalo, NY, June 22–24.
- C11. **Mehdi Momen**, Binversie EE, Baker LA, Gruel J, Patterson MM, Chu AC, Anderson RS, Kohler N, Kearney H, Svaren J, Muir P, Sample SJ. **2022**. Age-associated gene and gene-pathway alterations in dog peripheral nerve. Peripheral Nerve Society Meeting, Miami, FL [poster].
- C12. **Mehdi Momen**, Binversie EE, Baker LA, Gruel J, Patterson M, Chu AC, Anderson RS, Kohler N, Kearney H, Svaren J, Muir P, Sample SJ. **2022**. Evaluation of differential gene expression in a canine late-onset peripheral neuropathy. Peripheral Nerve Society Meeting, Miami, FL [poster].
- C13. **Mehdi Momen**, Brounts SH, Binversie EE, Sample SJ, Davis BW, Rosa GJM, Muir P. **2022**. Genome-wide signature of selection analysis reveals several genomic regions under positive selection for equine degenerative suspensory ligament desmitis, a spontaneous model of degenerative tendon/ligament injury. ORS Annual Meeting, Tampa, FL [poster].
- C14. **Mehdi Momen**, Brounts SH, Binversie EE, Sample SJ, Davis BW, Rosa GJM, Muir P. **2022**. Categorical genome-wide association study of equine degenerative suspensory ligament desmitis, a spontaneous model of degenerative tendon/ligament injury. ORS Annual Meeting, Tampa, FL [poster].
- C15. **Mehdi Momen**, Kohler NL, Binversie EE, Dentino M, Sample SJ. **2022**. Heritability of osteosarcoma in the Irish Wolfhound. ORS Annual Meeting, Tampa, FL [poster].
- C16. **Mehdi Momen**, Kohler NL, Binversie EE, Dentino M, Sample SJ. **2022**. Heritability of osteosarcoma in the Irish Wolfhound. 9th Annual SVM Phi Zeta Research Day, Madison, WI [poster].
- C17. Patterson M, **Mehdi Momen**, Brounts SH, Binversie EE, Kearney H, Kohler N, Anderson RS, Davis BW, Rosa GJM, Sample SJ, Muir P. **2022**. Categorical genome-wide association study of equine degenerative suspensory ligament desmitis, a spontaneous model of degenerative tendon/ligament injury. 9th Annual SVM Phi Zeta Research Day, Madison, WI [poster].
- C18. Kearney H, **Mehdi Momen**, Baker LA, Binversie EE, Gruel J, Patterson M, Kohler N, Anderson RS, Lee B, Brauer K, Sample SJ, Muir P. **2022**. Genome-wide association of anterior cruciate ligament rupture in the Labrador Retriever. 9th Annual SVM Phi Zeta Research Day, Madison, WI [poster]; UW–Madison CALS Research Symposium [poster]; Undergraduate Symposium, Madison, WI [oral].
- C19. Anderson RS, Rylander H, Chu AK, Kohler NA, Patterson MM, Kearney HK, **Mehdi Momen**, Muir P, Johnson R, Sample SJ. **2022**. Electrodiagnostic evaluation of late-onset laryngeal paralysis in Labrador Retrievers. 9th Annual SVM

Phi Zeta Research Day, Madison, WI [poster]; UW–Madison CALS Research Symposium [oral]; Undergraduate Symposium, Madison, WI [oral].

- C20. Chu A, Gruel J, Anderson RS, Patterson M, Kearney H, **Mehdi Momen**, Duncan ID, Baker LA, Binversie EE, Svaren J, Muir P, Sample SJ. **2022**. A quantitative, pathologic classification of idiopathic laryngeal paralysis in Labrador Retrievers. 9th Annual SVM Phi Zeta Research Day, Madison, WI [oral and poster]; Comparative Biomedical Sciences Graduate Student Seminar, Madison, WI [oral].
- C21. Perino J, Patterson M, **Mehdi Momen**, Borisova M, Heslegrave A, Zetterberg H, Gruel J, Binversie EE, Baker LA, Svaren J, Sample SJ. **2022**. [Title to be added]. Comparative Biomedical Sciences Graduate Student Seminar, Madison, WI [oral].
- C22. Perino J, Patterson M, **Mehdi Momen**, Borisova M, Heslegrave A, Zetterberg H, Gruel J, Binversie EE, Baker LA, Svaren J, Sample SJ. **2021**. Neurofilament light plasma concentration associates with age, weight and height in Labrador Retrievers. Peripheral Nerve Society Annual Meeting (virtual) [poster].
- C23. Perino J, Binversie EE, Baker LA, Gruel J, **Mehdi Momen**, Berres M, Muir P, Sample SJ. **2020**. Late-onset laryngeal paralysis: differentially expressed genes and pathways within peripheral nerve. ACVS Surgery Summit (virtual) [poster].
- C24. Mohammadpanah M, **Mehdi Momen**, Gilbert H, Larzul C, Mercat MJ, Ayatollahi Mehrgardi A, Tusell L. **2019**. Additive and dominance genomic parameters for backfat thickness in purebred and crossbred pigs. Annual Meeting of the European Federation of Animal Science (EAAP), Ghent, Belgium [poster].
- C25. Pegolo S, **Mehdi Momen**, Morota G, Rosa GJM, Gianola D, Bittante G, Cecchinato A. **2019**. Genome-based discovery of trait networks in dairy cattle. EAAP Annual Meeting, Ghent, Belgium [poster].
- C26. Cecchinato A, **Mehdi Momen**, Morota G, Rosa GJM, Gianola D, Pegolo S. **2019**. Structural equation models for genome-wide association study (SEM-GWAS) of interrelationships among udder health traits in dairy cattle. Congress of the Animal Science and Production Association (ASPA), Sorrento, Italy [poster].
- C27. **Mehdi Momen**, Ayatollahi Mehrgardi A, Brito Lopes F, Rosa GJM, Gianola D. **2016**. Combining marker and pedigree information may enhance multiple-trait genome-enabled prediction. 5th International Conference on Quantitative Genetics, Madison, WI [poster].
- C28. Jabari M, Sharifi F, **Mehdi Momen**. **2012**. Application of fuzzy linear regression (FLR) in agricultural economic studies. 1st International Conference on Econometrics, Methods and Applications, Sanandaj, Iran [poster].
- C29. **Mehdi Momen**, Emam Jomeh Kashan N, Sanjari H. **2011**. Study of gut morphological traits in pure and crossbred lambs of Zandi with Zel. 1st National Conference on New Technologies in Agriculture Science, Zanjan, Iran [poster].
- C30. Emam Jomeh Kashan N, **Mehdi Momen**, Nasiri Kh. **2011**. Simulation experiments for detection of quantitative trait loci (QTLs) in animal populations. 1st National Conference on New Technologies in Agriculture Science, Zanjan, Iran [poster].
- C31. Sanjari H, **Mehdi Momen**, Emam Jomeh Kashan N. **2011**. Evaluation of the number and homozygosity of sex alleles in honey bee colonies. 1st National

Conference on Rearing Management of Livestock in Tropical Regions, Kerman, Iran [poster].

- C32. **Mehdi Momen**, Nasiri Kh. **2011**. Genetic algorithm simulations for detection of quantitative trait loci effects. 5th National Conference on New Ideas in Agriculture, Isfahan, Iran [poster].
- C33. Vesi A, **Mehdi Momen**. **2011**. Application of fuzzy logic in economic improvement of animal production units. 5th National Conference on New Ideas in Agriculture, Isfahan, Iran [poster].
- C34. **Mehdi Momen**, Emam Jomeh Kashan N, Sharifi SD. **2010**. Investigation of fatty acid profile of fat-tail and visceral fats of Zandi pure lambs and their crosses with Zel rams. 4th National Conference in Animal Science, Karaj, Iran [poster].
- C35. **Mehdi Momen**, Emam Jomeh Kashan N, Sharifi SD. **2010**. Study of relationship between blood biochemical traits and carcass traits in pure lambs of Chaal and Zandi and their crosses with Zel rams. 4th National Conference in Animal Science, Karaj, Iran [poster].

Books

- B1. Morteza Baratti, **Mehdi Momen**. **2011**. Experimental Design in Agricultural Sciences. Pardazeshgaran Press.
- B2. **Mehdi Momen**, Maysam Mohseni. **2009**. A Handbook of Animal Science Questions for Undergraduate (B.Sc.) Students. Pardazeshgaran Press.
- B3. Morteza Baratti, Ali Shahbazi, **Mehdi Momen**, Shina Zaman. **2009**. A Handbook of Agronomy Questions for Undergraduate (B.Sc.) Students. Pardazeshgaran Press.

GRANT PROPOSALS

- 1. **The American Rottweiler Club (ARC):** Genetic testing for cruciate ligament rupture using polygenic risk score (PRS) prediction in Rottweiler dogs. **(PI)**. *Funded*.
- 2. **Morris Animal Foundation:** Developing an automated explainable AI framework for grading ACL rupture severity and stratifying risk scores using orthopedic X-Ray images in three dog breeds. **(PI)**. *Under review*.
- 3. **NIH R01-NIAMS:** Shifting the paradigm for anterior cruciate ligament rupture. **(Multi-PI)**. *Under review*.
- 4. **NIH K01-NIAMS:** Investigation of ACL rupture cross-species pleiotropy and risk prediction in dogs and human beings. **(PI)**. *Under review*.
- 5. **AKC:** Genetic testing for cruciate ligament rupture using polygenic risk score (PRS) prediction. **(Co-PI)**. *Funded*.
- 6. **NLM T15 LM007359:** Identification of Anterior Cruciate Ligament (ACL) rupture variants and pathways that are shared between humans and dogs **(PI)**. *Funded*.

PATENTS

1. Muir P, Baker LA, **Momen M.** Method to predict heritable canine non-contact cruciate ligament rupture. P150052US02. WARF.
2. Muir P, Sabrina Brounts, **Momen M.**, Brian Davis, Guilherme JM. Rosa. Genetic contribution to degenerative suspensory ligament desmitis in the horse. 00550000001Bk31AAC. WARF.

PROFESSIONAL PRESENTATION

1. Selection Signature Analysis of Spontaneous Equine Degenerative Tendon/Ligament Injury using Genomic Data. The 2022 NLM Informatics Training Conference. Buffalo NY (Jun. 23, 2022)
2. Polygenic risk score (PRS) prediction for anterior cruciate ligament rupture (ACLR) in the canine model. 1360 Gen-Biotechnology Center Building 425 Henry Mal, University of Wisconsin-Madison (Jan. 25, 2022).
3. Across-breed genome-wide association study for degenerative suspensory ligament desmitis in the horse. Comparative Genetic Research Laboratory, School of Veterinary Medicine, University of Wisconsin-Madison (June 17, 2021).
4. Modeling multiple phenotype in Quantitative Genetics using data-driven genomics exploratory factor analysis and Bayesian network learning. 4th International & 16th Iranian Genetics Congress. (September 31, 2020).
5. Network-Based Genome-Wide Association Analysis Using Structural Equation Models (SEM-GWAS), Comparative Genetic Research Laboratory, School of Veterinary Medicine, University of Wisconsin-Madison. (September 9, 2019).
6. Gain obtained by enriching whole genome prediction machines using genotypic data and bioinformatics initiative tools, Department of Animal Sciences, University of Tehran. (March 6, 2018).
7. The Bayesian controversy in genome-enabled prediction in animal breeding, Department of Animal Sciences, Shahid Bahonar University of Kerman (SBUK). (May 10, 2017)

TEACHING

Graduate courses

- Biostatistics, Quantitative Genetics, and Genomics in Animal Breeding, Statistical Analysis of Large Genomic data, Advance Genetic Prediction, Department of Animal Science, Shahid Bahonar University of Kerman, Kerman, Iran (2017-2018).

Undergraduate courses

- Biostatistics and Statistical in Agricultural Research, Department of Animal Science, University of Kerman, Kerman, Iran (2012-2018).
- General Biochemistry, department of agriculture improvement, Payam Noor University, Darab city, Fars province, Iran (2012).

- The basic of plant and animal genetic, department of agriculture improvement, Payam Noor University, Darab city, Fars province, Iran (2011).
- The basic of biotechnology in agricultural sciences, department of agriculture improvement, Payam Noor University, Darab city, Fars province, Iran (2011).
- Biostatistics and Statistical Designs in Agricultural Research as a teacher assistant, Department of Animal Science, University of Tehran, Tehran, Iran (2008).

Mentorship and Students

Student	Ed. level	Year	Email	Major
Hazim BM Izani	BS	2025-Now	binmohdzani@wisc.edu	Data Science
Faris HM. Zaimir	BS	2024-2025	mohamedzaimi@wisc.edu	Computer Science
Adam F. Horel	DVM	2023-2024	ahoerl@wisc.edu	Veterinary
Norisha Badhwar	BS	2024-Now	nbadhwar@wisc.edu	Genetics
Siavash Manzoori	PhD	2021-Now	siavashmanzoori@yahoo.com	Animal Genetics
Moslem Moghbeli	PhD	2022-Now	moslem.md65@gmail.com	Animal Genetics
Samantha Kisztelinski	BS	2025-Now	kisztelinski@wisc.edu	Biology
Suvir Grover	BS	2025-Now	sgrover8@wisc.edu	Genetics/ Economics

SKILLS

Statistical and Genetic Software: ASReml, Wombat, Polygenic risk score estimation softwares (GCTB, BOLT-LMM, LDPrd,...), BLUPF90, GCTA, Plink, QMsim, Impute, QTL cartographer, mcmcGLMM, Bayesian regression analysis packages (e.g., BGLR, JWAS, brms, ...). Gene Expression R packages (edgeR, DESeq2, Seurat, ...), Deep Learning and Neural Network Packages (TensorFlow, PyTorch, Keras), U-Net and scikit-image, NGS tools (samtools, vcftools, RSEM, STAR, Picard, GATK, ...), Gene Set Enrichment Analysis (GSEA).

Programming Language: R, Python, SAS, SPSS and L^AT_EX

JOURNAL REVIEW:

- International Journal of Molecular Sciences(2019-Now)
- BMC Plant Biology(2020-Now)
- Journal of Agricultural Science and Technology (2019-Now)
- Genes Journal (2019-Now)
- Italian Journal of Animal Science (2018-Now)
- Journal of Livestock Science and Technologies (2013-Now)

ADDITIONAL TRAINING

Short courses

- Courses Big Data and AI Modeling. Great Learning Academy. January 2024.
- Advanced Neural Networks in Biology Systems. Great Learning Academy. September 2023.
- Artificial Intelligence Fundamentals. Great Learning Academy. August 2024.
- Genomic Selection in Animal and Plant Breeding. 2016. Instructor: Prof. Mike Goddard. A.B chapman lecture, February 6-8, Madison, Wisconsin, USA

- Genomic Selection in the Era of Genome Sequencing. 2016. Instructor: Ben Hayes. The 5th International Conference on Quantitative Genetics, January 6-8, Madison, Wisconsin, USA.
- Statistical Genetics of Quantitative Traits and Complex Disease. 2016. Instructor: Matt Robinson. The 5th International Conference on Quantitative Genetics, January 8-10, Madison, Wisconsin, USA.
- Genomic selection methods and analysis of huge genomic data in animal breeding programs and genomics. 2013. Instructor: Rostam Abdolahi-Arpanahi. August 26, Shahid Bahonar University of Kerman, Faculty of Agriculture (SBUK), Kerman, IRAN.
- Programming and advance data analysis with R software. 2013. Instructor: Rostam Abdolahi-Arpanahi. August 27-28, Shahid Bahonar University of Kerman (SBUK), Faculty of Agriculture, Kerman, IRAN.

REFERENCES

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