Anil Sigdel, MS, PhD

Postdoctoral Research Associate
Department of Animal & Dairy Sciences
University of Wisconsin-Madison

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Links: Google Scholar | ResearchGate | GitHub

RESEARCH INTERESTS

I am a statistical and quantitative geneticist interested in integrating statistical learning methods with biological data in the prediction of complex traits in livestock. My research focuses on quantitative genetic and genomic analyses to enable genetic improvement of economically relevant traits in livestock. By integrating multiple data sources, I develop and apply statistical models to estimate variance components across various species, including sheep, goats, beef and dairy cattle, and buffaloes. My work includes genome-wide association studies (GWAS) with functional analyses to identify candidate genes and QTLs, and genomic predictions of breeding values using advanced methodologies such as random regression models and single-step GBLUP. As a researcher in quantitative genetics, I am proficient in R, Python, and UNIX, with extensive experience in statistical modeling of high dimensional data (phenotype, pedigree and genotype data) to identify genes, genetic markers and haplotypes that affect economically important traits in agriculture food animals.

EDUCATIONAL BACKGROUND

Doctor of Philosophy • Animal Sciences……...transfer. Sep. 2020 – May 2022

Dept. of Animal and Dairy Sciences, University of Wisconsin-Madison

Dissertation: Developing novel genomic tools for reducing fetal loss and stillbirth in dairy cattle

Doctor of Philosophy • Animal Sciences……...Aug. 2018 – Aug. 2020

Dept. of Animal Sciences, University of Florida

Master of Science • Animal Sciences……Jan. 2016 – May 2018

Dept. of Animal Sciences, University of Florida

Thesis: Genetic analysis of heat tolerance for production, reproduction, and health traits in US Holstein cows

Bachelor of Science • Veterinary Science & Animal Husbandry……...Aug. 2009 – Nov. 2014

Tribhuvan University, Kathmandu, Nepal

PROFESSIONAL EXPERIENCE

Research Associate ……March 2024 - present

Department of Animal & Dairy Sciences, UW-Madison

- Advisor Dr. Guilherme Rosa
- Projects with primary responsibility:
  - G × E GWAS and eco-regions specific genomic predictions in beef cattle

Fellowship in Canine Genomics…….June 2022 - Feb 2024

School of Veterinary Medicine, University of Pennsylvania

- Advisor Dr. Gustavo Aguirre
- Projects with primary responsibility:
  - Investigate the genetic basis of inherited eye-disorders including cataract and retinal diseases
  - Identify the genetic causes of inherited blindness including finding causal mutations to disease

Graduate Research Assistant (PhD candidate) ……..Sep. 2020 – May 2022

Dept of Animal & Dairy Sciences, University of Wisconsin-Madison

- Advisor Dr. Francisco Peñagaricano
- Project with primary responsibility:
  - Gene-mapping, gene-set analysis, and genomic prediction of pregnancy loss in US Holstein cattle

Intern ……...May 2021 – Aug. 2021

Council on Dairy Cattle Breeding, Bowie, Maryland

- Advisors: Dr. Nick Wu & Dr. Kristen Parker Gaddis
- Project with primary responsibility
  - Genetic evaluations of stillbirth in five US dairy breeds – A historical data-oriented feasibility study

Graduate Research Assistant (PhD student) ……Aug. 2018 – Aug. 2020

Dept. of Animal Sciences, University of Florida

- Advisor Dr. Francisco Peñagaricano
- Project assisting international visiting scholars in the lab

- Genetic effects of heat stress on milk fatty acids in Brazilian Holstein cattle
- Direct, indirect, and pleiotropic genetic effects associated with calving ease, retained placenta, and metritis in US Holstein cows.

Graduate Research Assistant (MS student) …….Jan. 2016 – May 2018

Dept. of Animal Sciences, University of Florida

- *Advisor: Dr.* Francisco Peñagaricano
- Project with primary responsibility
  - Genetic evaluation of milk production and reproduction traits under heat stress conditions in US Holstein cows
  - Genetic evaluation of post-partum health traits in US Holstein cattle

SKILLS

Animal breeding softwares: ASReml, PLINK, GCTA, Blupf90 software family

Programming languages: R, Python, Linux/UNIX, bash/shell scripting

Sequencing technologies: RNA-seq, DNA-seq, scRNA-seq, WGS

Other skills: Git, Bioconductor, High-Performance Computing (HPC)

TEACHING EXPERIENCE

University of Wisconsin-Madison

2021	Teaching assistant	Introduction to Animal & Veterinary Genetics, **Spring 2021**
2021	Teaching assistant	Principles of Animal Breeding, **Spring 2021**

University of Florida

2018	Teaching assistant	Applied statistics in Animal Sciences, **Fall 2018**
2017	Teaching assistant	Principles of Animal Breeding, **Fall 2017**

MENTORING EXPERIENCE

FALL 2019 – SPRING 2020

MENTOR to VISITING SCIENTIST from Brazil

- Developed and customized pipelines for genetic data processing
- Built statistical models for genomic association studies and genomic prediction.

FALL 2018

MENTOR to UNDERGRADUATE STUDENT from University of Florida

- Guided undergraduate student in high-dimensional genetic data analysis using computer clusters.

FALL 2017

MENTOR to UNDERGRADUATE VISITOR STUDENT from Brazil

- Introduced visiting student to basic animal breeding and statistics concepts.
- Facilitated student through basic data analysis/statistical processes.
- Produced one refereed publication and one abstract.

SCHOLARSHIP AND AWARDS

Department of Animal Sciences Teaching Award……. Nov. 2019

- *Dept. of Animal Sciences, University of Florida*

Department of Animal Sciences Top-up Award……. Oct. 2019

- *Dept. of Animal Sciences, University of Florida*

IFAS Dean's Office Top-Up Award…… Nov. 2019

- *Dean's office, IFAS, University of Florida*

Grinter Fellowship Award……. Sep. 2018

- *Graduate school, University of Florida*

William C. and Bertha M. Cornett Fellowship……Aug. 2018

- *College of Ag. & Life Sciences, University of Florida*

University of Florida Animal Sciences Matching Fellowship……. Aug. 2018-Aug. 2020

- *Awarded to a PhD student in the Animal Sciences program at the University of Florida to partially fund (50%) tuition and stipend.*

University of Florida Animal Sciences Matching Fellowship……. Jan. 2016-May 2018

- *Awarded to a MS student in the Animal Sciences program at the University of Florida to partially fund (50%) tuition and stipend.*

TRAVEL AWARDS

Travel Grant to attend Association for Research in Vision and

Ophthalmology (ARVO) annual meeting……. Apr. 2023

New Orleans, Louisiana

- *Penn Postdoc Association Presidential Travel Award, University of Pennsylvania $500.00*

Travel Grant to attend 11th World Congress on Genetics

applied to Livestock Production…… Feb. 2018

Auckland, New Zealand

- *Institute of food & Agricultural Sciences, University of Florida $350.00*
- *Graduate Student Council, University of Florida $250.00*

PUBLICATIONS

Full List of Publications: Google Scholar (Statistics: Feb 7, 2025): citations: 318**;** h-index=9; i10-index = 9

PEER-REVIEWED JOURNAL ARTICLES

1. Weigel KA., Chasco A., Pacheco HA., **Sigdel, A.,** Guinan, FL., Lauber MR., Fricke PM., and Peñagaricano, F. (2024). Genomic selection in dairy cattle: impact and contribution to the improvement of bovine fertility. Clinical Theriogenology 2024, 16, 10399

2. **Sigdel, A.,** Bisinotto, R.S., and Peñagaricano, F. (2022). Genetic analysis of fetal loss in Holstein Cattle**.** Journal of Dairy Science 105, 9012-9020

3. **Sigdel, A.,** N. Wu, K. P. Gaddis, D. Norman, J. A. Carrillo, J. Burchard, F. Peñagaricano and J. Dürr (2022). Genetic evaluations of stillbirth for five United States dairy breeds: A data-resource feasibility study. Frontiers in Genetics 13

4. Dauria, B.D., **Sigdel, A.,** Petrini, J., Bóscollo, P.P., Pilonetto, F., Salvian, M., Rezende F.M., Pedrosa V.B., Bittar, C.M.M., Machado P.F., Coutinho L.L., Wiggans G.R. and G.B. Mourão (2022). Genetic effects of heat stress on milk fatty acids in a Brazilian Holstein cattle. Journal of Dairy Science 105, 3296-3305

5. Bhattarai, N., Poudel, J., Kolakshyapati, M.R., Sharma, M.P., Gorkhali, N.A., **Sigdel, A.,** Upadhayaya, S., and Sapkota, S. (2022). Evaluation of reproductive performance and litter traits of Khari, Jamunapari and Sirohi crossbred goats in Surkhet district of Karnali province, Nepal. Journal of Agriculture and Forestry University 71-80

6. Sigdel, A., Bisinotto, R.S., and Peñagaricano, F. (2021). Genes and pathways associated with

pregnancy loss in dairy cattle. Scientific Reports 11, 13329

7. Pandey, A., Devkota, A., **Sigdel, A.,** Yadegari, Z., Dumenyo, K. and Taheri, A. (2021). Citiric acid/β-alanine carbon dots as a novel tool for delivery of plasmid DNA into *E.coli* cells. Scientific Reports 11. 23964

8. Sigdel, A., Liu, L., Abdollahi-Arpanahi, R., Aguilar, I., and Peñagaricano, F. (2020). Genetic dissection of reproductive performance of dairy cows under heat stress. Animal Genetics 51, 511-520

9. Sah, K., Karki, P., Shrestha, R.D., **Sigdel, A.,** Adesogan, A.T., and Dahl, G.E. (2020). MILK Symposium review: Improving control of mastitis in dairy animals in Nepal*. Journal of Dairy Science 103,9740-9747

10. Sigdel, A., Abdollahi-Arpanahi, R., Aguilar, I., and Peñagaricano, F. (2019). Whole genome mapping reveals novel genes and pathways involved in milk production under heat stress in US Holstein cows**.** Frontiers in Genetics 10

11. Vatankhah, M., **Sigdel, A.,** and Abdollahi-Arpanahi, R. (2019). Population structure of Lori-Bakhtiari sheep in Iran by pedigree analysis. Small Ruminant Research 174, 148-155

12. Pacheco, H.A., Da Silva, S., **Sigdel, A.,** Mak, C.K., Galvão, K.N., Texeira, R.A., Dias, L.T., and Peñagaricano, F. (2018). Gene mapping and gene-set analysis for milk fever incidence in Holstein dairy cattle. Frontiers in Genetics, 9

13. **Sigdel, A.,** Bhattarai, N., Kolachhapati, M.R. and Paudyal S. (2015). Estimation of genetic parameters for productive traits of Murrah buffaloes in Kaski, Nepal. International Journal of research, 2(5)

14. **Sigdel, A.,** Bhattarai, N., and Kolachhapati, M.R. (2015). Impacts of climate change on milk production of Murrah buffaloes in Kaski, Nepal. Proceedings of International Conference on Climate Change Innovation and Resilience for Sustainable livelihood, 12-14 January 2015, Kathmandu, Nepal

15. **Sigdel A.,** Kolachhapati. M.R., and Bhattarai N. (2014). Effect of non-genetic factors on productive traits of Murrah buffaloes. Nepalese Journal of Agricultural Sciences 12: 148-152

MANUSCRIPTS IN PREPARATION

1. **Sigdel, A.,** Niggel, J.K., Aguirre, G.D. and Murgiano, L. Whole-genome mapping unravels genetic etiology associated with complex phenotypes of collie eye anomaly.

2. **Sigdel, A.,** Niggel, J.K., Aguirre, G.D. and Murgiano, L. Deciphering the genetic basis of late-onset cataract in American cocker spaniel population.

PROFESSIONAL SERVICE

1. Ad-hoc reviewer, Journal of Dairy Science (2024 – present)
2. Ad-hoc reviewer, BMC Genomics (2024 – present)
3. Ad-hoc reviewer, Frontiers in Microbiology (2023 – present)
4. Ad-hoc reviewer, Animals (2021 – present)
5. Ad-hoc reviewer, PeerJ (2021 – present)
6. Ad-hoc reviewer, Frontiers in Genetics (2021 – present)
7. Ad-hoc reviewer, Frontiers in Microbiology (2021 – present)

PROFESSIONAL MEMBERSHIP

1. Member, American Society of Animal Science, 2024-present
2. Member, Association for Research in Vision and Ophthalmology, 2023-present
3. Member, American Dairy Science Association, 2016-present

PROFESSIONAL DEVELOPMENT CONFERENCES

1. 2024 Midwest section American society of Animal Science, Annual Meeting Madison, WI
2. 2023 The Association for Research in Vision and Ophthalmology, Annual Meeting – New Orleans, Louisiana
3. 2022 International conference on canine and feline genetics and genomics – Huntsville, Alabama
4. 2021 ADSA Annual Meeting – Virtual Meeting
5. 2020 ADSA Annual Meeting – Virtual Meeting
6. 2019 ADSA Annual Meeting – Cincinnati, OH
7. 2018 ADSA Annual Meeting – Knoxville, TN
8. 2018 World Congress on Genetics Applied to Livestock Production – Auckland, New Zealand
9. 2017 ADSA Annual Meeting – Pittsburgh, PA

REFERENCES

1. Guilherme Rosa, PhD
Professor
Precision Livestock Production & Breeding
Department of Animal & Dairy Sciences
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2. Francisco Peñagaricano, PhD
Associate Professor
Quantitative Genomics and Computational Biology
Department of Animal & Dairy Sciences
University of Wisconsin-Madison
fpenagarican@wisc.edu | 608-320-7579

3. Kent Weigel, PhD
Professor
Animal Breeding and Quantitative Genetics
Department of Animal & Dairy Sciences
University of Wisconsin-Madison
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