Anderson A.C. **Alves**

Assistant Professor (Precision Livestock Science)

Department of Animal and Dairy Science, University of Georgia, 425 River Rd, Athens, GA, USA, 30602

alvesand@uga.edu | alvesand.netlify.app | 0000-0001-8306-0487 | alvesand

I work on the development and application of efficient statistical learning methods and computational tools for the analysis of large livestock data. My research program centers on combining on-farm sensor data and artificial intelligence (AI) techniques for animal monitoring. The general goal is to create decision-making tools that will support efficient management decisions. Additionally, we employ high-throughput phenotyping alongside modern molecular technologies to investigate the genetic basis of novel and hard-to-measure traits. Our lab mission is to harness top-notch technologies to improve animal production, reproduction, welfare and health, ultimately supporting efficient and sustainable livestock farming.

EDUCATION

Ph.D., Animal Breeding and Genetics — *Jaboticabal, Brazil*

Sao Paulo State University (UNESP) — *Mar. 2016 - Nov. 2019*

- Dissertation: Applying machine learning for genomic analysis of reproductive traits in Nellore cattle.
- Advisor: Dr. Lucia Galvão de Albuquerque

M.S., Animal Science — *Fortaleza, Brazil*

Federal University of Ceara (UFC) — *Feb. 2014 - Dec. 2015*

- Thesis: Quantitative genetic study of Santa Inês breed sheep performance in agricultural exhibitions. [In Portuguese].
- Advisor: Dr. Raimundo Lobo

B.S., Animal Science — *Sobral, Brazil*

State University Vale do Acarau — *Aug. 2009 - Dec. 2013*

PROFESSIONAL EXPERIENCE

Assistant Professor (Precision Livestock Science) — *Athens, GA, USA*

Department of Animal and Dairy Science, University of Georgia-Athens — *Jan 2024 - Present*

- FTE: 70% Research & 30% Teaching

Postdoctoral Research Associate — *Madison, WI, USA*

Department of Animal and Dairy Sciences, University of Wisconsin-Madison — *Mar 2021 - Dec 2021*

- Main Responsibilities: Investigating the genetic and genomic basis of novel feed efficiency and feeding behavior traits in commercial broilers. Development and application of efficient statistical learning methods for data-driven supported decisions such as the classification of mortality in broilers and genome-assisted prediction of complex traits.
- Additional responsibilities: Linux server manager, monthly meetings with industry partners, writing manuscripts, R developer, assisting graduate student academic activities and research, and presenting seminars and lectures.

Lecturer of Basic, Technical, and Technological Education — *S.R. Mangabeiras, MA, Brazil*

Federal Institute of Education, Science, and Technology of Maranhão. — *Dec 2018 - Feb 2018*

- Teaching experience –Teaching at the undergraduate level in the following courses: Animal Breeding I, Basic Statistics (B.S. Animal Science), Genetics (B.S. Biology), and Experimental Statistics (B.S. Agronomy).
- Additional activities: mentoring B.S. research projects, administrative duties, member of the inclusion committee for people with disabilities

Graduate Research Assistant — *Jaboticabal, SP, Brazil*

Sao Paulo State University (UNESP) — *Mar 2016 - Dec 2017*

- Research Activities - Development and application of statistical methods for genomic-based analysis in beef cattle. Meat quality data collecting in Beef cattle.
- Teaching experience - Teaching assistant (B.S. Biology, course: Biostatistics).

Research Interests

- Developing and applying computational and statistical tools for precision livestock farming and animal breeding.
- Integrating machine learning and sensor data for optimized livestock management.
- Leveraging modern molecular and sensor technologies to enhance farming efficiency and sustainability.

PUBLICATIONS

12 **Refeered Journal Publications:** First author: 7 , Co-author: 5 , Corresponding author: 0

1 **Book Chapters:** First author: 0 , Co-author: 1 , Corresponding author: 0

2 **Conference Papers:** First author: 1 , Co-author: 1 , Corresponding author: 0

36 **Conference Abstracts:** First author: 13 , Co-author: 21 , Corresponding author: 2

Full List Available at: `https://alvesand.netlify.app/publications`

Google Scholar statistics (November 2023): Citations: 159 , h-index: 6 , i10-index: 4 .

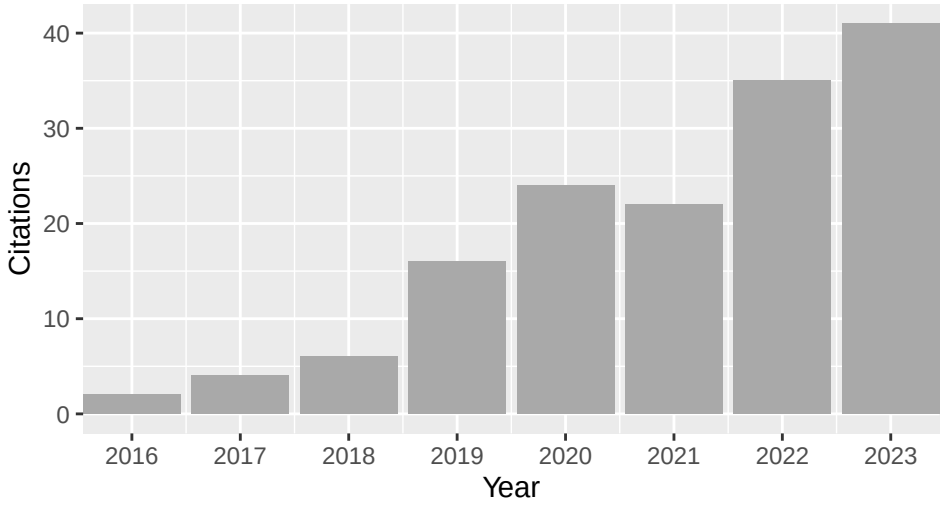

Figure 1. Citation history since 2016.

Peer-reviewed Papers

1. Alves, A. A. C., Fernandes, A. F. A., Lopes, F. B., Breen, V., Hawken, R., Gianola, D., & Rosa, G. J. M. (2023). (Quasi) multitask support vector regression with heuristic hyperparameter optimization for whole-genome prediction of complex traits: a case study with carcass traits in broilers. *G3 Genes|Genomes|Genetics*, *13*(8), jkad109. `https://doi.org/10.1093/g3journal/jkad109`
2. Freitas, L. A., Savegnago, R. P., Alves, A. A. C., Costa, R. L. D., Munari, D. P., Stafuzza, N. B., Rosa, G. J. M., & Paz, C. C. P. (2023). Classification performance of machine learning methods for identifying resistance, resilience, and susceptibility to haemonchus contortus infections in sheep. *Animals*, *13*(3). `https://doi.org/10.3390/ani13030374`
3. Pinto, D. L., Selli, A., Tulpan, D., Andrietta, L. T., Garbossa, P. L. M., Voort, G. V., Munro, J., McMorris, M., Alves, A. A. C., Carvalheiro, R., Poleti, M. D., Carvalho Balieiro, J. C. de, & Ventura, R. V. (2023). Image feature extraction via local binary patterns for marbling score classification in beef cattle using tree-based algorithms. *Livestock Science*, *267*, 105152. https://doi.org/`https://doi.org/10.1016/j.livsci.2022.105152`
4. Alves, A. A. C., Costa, R. M. da, Fonseca, L. F. S., Carvalheiro, R., Ventura, R. V., Rosa, G. J. de M., & Albuquerque, L. G. (2022). A random forest-based genome-wide scan reveals fertility-related candidate genes and potential inter-chromosomal epistatic regions associated with age at first calving in nellore cattle. *Frontiers in Genetics*, *13*, 834724. `https://doi.org/10.3389/fgene.2022.834724`
5. Bresolin, T., Passafaro, T. L., Braz, C. U., Alves, A. A. C., Carvalheiro, R., Chardulo, L. A. L., de Magalhães Rosa, G. J., & de Albuquerque, L. G. (2022). Investigating potential causal relationships among carcass and meat quality traits using structural equation model in nellore cattle. *Meat Science*, *187*, 108771. https://doi.org/`https://doi.org/10.1016/j.meatsci.2022.108771`
6. Alves, A. A. C., Andrietta, L. T., Lopes, R. Z., Bussiman, F. O., Silva, F. F. e, Carvalheiro, R., Brito, L. F., Balieiro, J. C. de C., Albuquerque, L. G., & Ventura, R. V. (2021). Integrating audio signal processing and deep learning algorithms for gait pattern classification in brazilian gaited horses. *Frontiers in Animal Science*, *2*. `https://doi.org/10.3389/fanim.2021.681557`

7. Alves, A. A. C., Espigolan, R., Bresolin, T., Costa, R. M., Fernandes Júnior, G. A., Ventura, R. V., Carvalheiro, R., & Albuquerque, L. G. (2021). Genome-enabled prediction of reproductive traits in nellore cattle using parametric models and machine learning methods. *Animal Genetics*, *52*(1), 32–46. https://doi.org/https://doi.org/10.1111/age.13021

8. Alves, A. A. C., Costa, R. M. da, Bresolin, T., Fernandes Júnior, G. A., Espigolan, R., Ribeiro, A. M. F., Carvalheiro, R., & Albuquerque, L. G. de. (2020). Genome-wide prediction for complex traits under the presence of dominance effects in simulated populations using GBLUP and machine learning methods. *Journal of Animal Science*, *98*(6), skaa179. https://doi.org/10.1093/jas/skaa179

9. Cardoso, D. F., Fernandes Júnior, G. A., Scalez, D. C. B., Alves, A. A. C., Magalhães, A. F. B., Bresolin, T., Ventura, R. V., Li, C., Sena Oliveira, M. C. de, Porto-Neto, L. R., Carvalheiro, R., Oliveira, H. N. de, Tonhati, H., & Albuquerque, L. G. (2020). Uncovering sub-structure and genomic profiles in across-countries subpopulations of angus cattle. *Scientific Reports*, *10*(1), 8770. https://doi.org/10.1038/s41598-020-65565-1

10. Alves, A. A. C., Chaparro Pinzon, A., Costa, R. M. da, Silva, M. S. da, Vieira, E. H. M., Mendonça, I. B. de, Sena Sales Viana, V. de, & Lôbo, R. N. B. (2019). Multiple regression and machine learning based methods for carcass traits and saleable meat cuts prediction using non-invasive in vivo measurements in commercial lambs. *Small Ruminant Research*, *171*, 49–56. https://doi.org/https://doi.org/10.1016/j.smallrumres.2018.12.008

11. Lôbo, A. M. B. O., Lôbo, R. N. B., Facó, O., Souza, V., Alves, A. A. C., Costa, A. C., & Albuquerque, M. A. M. (2017). Characterization of milk production and composition of four exotic goat breeds in brazil. *Small Ruminant Research*, *153*, 9–16. https://doi.org/https://doi.org/10.1016/j.smallrumres.2017.05.005

12. Alves, A. A. C., Lôbo, A. M. B. O., Facó, O., Silva, L. P. da, & Lôbo, R. N. B. (2016). Genetic parameters for rank of the santa inês sheep in agricultural fairs using bayesian procedures. *Italian Journal of Animal Science*, *15*(4), 604–609. https://doi.org/10.1080/1828051X.2016.1248866

Book Chapter

1. Lôbo, A. M. B. O., Lôbo, R. N. B., Alves, A. A. C., & Facó, O. (2019). Genetic improvement of goats. In A. B. Selaive-Villarroel & V. P. Guimarães (Eds.), *Goat production in brazil* (1st ed., pp. 279–304).

Papers published in proceedings

1. Alves, A. A. C., Fernandes, A. F. B., Breen, V., Hawken, R., & Rosa, G. J. de M. (2022). Quasi multi-task support vector regression for whole-genome prediction of carcass traits in commercial broilers. *Proceedings of the 12th World Congress on Genetics Applied to Livestock Production*.

2. Bresolin, T., Passafaro, T. L., Lopes, F. B., Alves, A. A. C., Chardulo, L. A. L., Carvalheiro, R., & Albuquerque, L. G. (2018). Causal relationship among growth, carcass, and meat traits using structural equation model in nelore cattle. *Proceedings of the 11th World Congress on Genetics Applied to Livestock Production*.

Conference Abstracts (*Last 3 years*)

1. Alves, A. A. C., Araujo Fernandes, A. F., Breen, V., & Hawken, R. (2023). 153 Genomic Prediction and Genetic Parameters of Residual Feed Intake Computed Using Linear and Non-Linear Regression Methods in Broiler Chickens. *Journal of Animal Science*, *101*(Supplement_3), 45–46. https://doi.org/10.1093/jas/skad281.055

2. Alves, A. A. C., Araujo Fernandes, A. F., Breen, V., Hawken, R., & Rosa, G. J. M. (2023). 152 Leveraging Rfid Technology to Investigate the Genetic Associations Between Feeding Behavior and Leg Health in Floor-Raised Broilers. *Journal of Animal Science*, *101*(Supplement_3), 44–44. https://doi.org/10.1093/jas/skad281.053

3. Alves, A. A. C., Fernandes, A. F. B., Lopes, F. B., Breen, V., Hawken, R., & Rosa, G. J. de M. (2022). Prediction of culling and mortality risks in group-housed broilers using machine learning methods trained with time-series data of feeding behavior traits. *Journal of Animal Science*, *100*(Supplement_3), 2. https://doi.org/10.1093/jas/skac247.002

4. Alves, A. A. C., Fernandes, A. F. B., Lopes, F. B., Breen, V., Hawken, R., & Rosa, G. J. de M. (2022). Genetic associations between feeding behavior and economic interest traits in group-housed broilers. *Journal of Animal Science*, *100*(Supplement_3), 9–10. https://doi.org/10.1093/jas/skac247.016

5. Santana, T. E. Z., Veroneze, R., Alves, A. A. C., Menezes, G. R. O., & Rosa, G. J. de M. (2022). Gaussian kernel based on geographic information to model farm effects in genetic evaluation of pasture-raised beef cattle. *Journal of Animal Science*, *100*(Supplement_3), 209. https://doi.org/10.1093/jas/skac247.380

6. Freitas, L., Savegnago, R., Alves, A. A. C., Costa, R., Rosa, G. J. de M., & Paz, C. (2022). Classification performance of multinomial logistic regression for identifying resistance, resilience, and susceptibility to gastrointestinal nematode infections in sheep. *Journal of Animal Science*, *100*(Supplement_3), 220. https://doi.org/10.1093/jas/skac247.400

7. Ventura, R. V., Lopes, R. Z., Andrietta, L. T., Bussiman, F., Balieiro, J., Carvalheiro, R., Silva, F. F., Brito, L., & Alves, A. A. C. (2020). Audio information retrieval for describing gait patterns in brazilian horses. *Journal of Animal Science*, *98*(Supplement_4), 27. https://doi.org/10.1093/jas/skaa278.048

8. Costa, R. M., Alves, A. A. C., Chud, T. C. S., Bernardes, P. A., Baldi, F., Lôbo, R. B., & Munari, D. P. (2020). Influence of the genomic information inclusion on the breeding values accuracy in nellore sires. *Proceedings of the VI CBRG*.

9. Costa, R. M., Alves, A. A. C., Watanabe, R. N., Sbardella, A. P., Chud, T. C. S., Lôbo, R. B., & Munari, D. P. (2020). Genetic parameters estimate for daily weight gain and carcass traits in nellore cattle with and without including genomic information. *Proceedings of the VI CBRG*.

Forthcoming publications

1. Freitas, L. A., Savegnago, R. P., Alves, A. A. C., Stafuzza, N. B., Pedrosa, V. B., Rocha, R. A., Rosa, G. J. de M., & Paz, C. C. P. (2023). Genome-enabled prediction of indicator traits of resistance to gastrointestinal nematodes in sheep using parametric models and artificial neural networks. *Preventive Veterinary Medicine*.

2. Alves, A. A. C., Fernandes, A. F. B., Breen, V., Hawken, R., & Rosa, G. J. de M. (2023). Monitoring mortality and welfare-culling in group-housed broilers using machine learning algorithms trained with feeding behavior time-series data. *Computers and Electronics in Agriculture*.

3. Alves, A. A. C., Fernandes, A. F. B., Lopes, F. B., Breen, V., Hawken, R., & Rosa, G. J. de M. (2023). Genetic parameters of feed efficiency and novel feeding behavior traits measured in group-housed broilers using a real-time radio-frequency feeding system. *Poultry Science*.

Grants

Table 1. Summary of grants awarded

Role	Agency	Area	Award
CoPI	IIPA (UGA)	Ultrasound analysis using computer vision	$22,500

Mentoring

Table 2. Summary of mentoring activities

Category	Total
Undergraduate Research Projects (Advisor)	2
Undergraduate Students (Committee member)	3
Graduate Students (Co-advisor)	2
Graduate Students Qualifying Exam (Committee member)	2

TEACHING

Digital Technologies for Animal Monitoring *Role: Invited Lecturer*

University of Wisconsin-Madison *Semester: 2023.1*

- Graduate Level

Statistical Genetics (SISG) Module 9: Quantitative Genetics — *Role: Teaching Assistant*
University of Washington (UW Summer Institutes) — *Semester: 2022.2*
- Graduate Level

Statistical Genetics (SISG) Module 12: Mixed Model in Quantitative Genetics — *Role: Teaching Assistant*
University of Washington (UW Summer Institutes) — *Semester: 2022.2*
- Graduate Level

ANSCI 610 Quantitative Genetics — *Role: Teaching Assistant*
University of Wisconsin-Madison — *Semester: 2021.3, 2023.3*
- Graduate Level

Experimental Statistics — *Role: Instructor*
Federal Institute of Education, Science, and Technology of Maranhao (IFMA) — *Semester: 2019.1, 2020.1*
- Undergraduate Level

Statistics — *Role: Instructor*
Federal Institute of Education, Science, and Technology of Maranhao (IFMA) — *Semester: 2019.2*
- Undergraduate Level

Genetics — *Role: Instructor*
Federal Institute of Education, Science, and Technology of Maranhao (IFMA) — *Semester: 2018.2, 2020.1*
- Undergraduate Level

Animal Breeding I — *Role: Instructor*
Federal Institute of Education, Science, and Technology of Maranhao (IFMA) — *Semester: 2018.1*
- Undergraduate Level

Biostatistics — *Role: Teaching Assistant*
Sao Paulo State University (UNESP) — *Semester: 2017.1*
- Undergraduate Level

Invited Presentations

Harnessing High-Throughput Phenotyping Technologies to Advance Livestock Production Systems — *Online*
Purdue University (Webinar Series) — *September 28th, 2023*

Leveraging Artificial Intelligence Techniques and Sensor Technologies to Enhance Animal Production Systems — *Athens, GA, USA*
University of Georgia (Department of Animal and Dairy Science) — *May 12th, 2023*

Leveraging Artificial Intelligence Techniques and Sensor Technologies to Enhance Animal Production Systems — *Montreal, QC, Canada*
McGill University (Department of Animal Sciences) — *May 23th, 2023*

Harnessing Artificial Intelligence Techniques to Enhance Animal Production Systems — *State College, PA, USA*
Pennsylvania State University — *July 11th, 2023*

Statistical pitfalls and their implications for the research reproducibility in animal sciences — *San Antonio, TX, USA*
Poultry Science Annual Meeting — *July 13th, 2022*

Genome-enabled analysis of complex traits with machine learning methods — *Online*
CGIL Seminar W2022, University of Guelph — *April 1st, 2022*

Feed Efficiency and Novel Feeding Behavior Traits in Broilers — *Online*
Cobb Webinar Series — *January 19th, 2022*

Machine learning in the animal production: concepts, challenges, and perspectives [In Portuguese] — *Online*
Semana Nacional de Ciência e Tecnologia (SNCT) — *November 12th 2020*

Software

R packages

- **qmtsvr**: (Quasi) Multi-task Support Vector Regression methods for genome-wide prediction of complex traits. **Documentation:** `https://alvesand.netlify.app/qmtsvr_doc`; **Source Code:** `https://github.com/alvesand/qmtsvr`

Python and R scripts

- **PyGA:** Runs a simple genetic algorithm for tuning hyperparameters in the sklearn library. **Source Code:** `https://github.com/alvesand/pyga`
- **SISGlabs:** A suite of R scripts to illustrate some concepts in Quantitative Genetics and Mixed Model Theory. **Source Code:** `https://github.com/alvesand/SISG_Labs_Modules_9_and_12`

Service

- **Ad-hoc Reviewer** - Journal of Animal Breeding and Genetics, BMC Genomics, Journal of Animal Science, Agriculture, Scientific Reports, Small Ruminant Research, Tropical Animal, Health and Production.

Society Memberships

- American Society of Animal Science (ASAS)

Skills

Table 3. Highlighted technical skills.

Programming Languages	Analysis Tools	Expertise
R, Python, C++ (Beginner)	Keras, Tensorflow,pytorch, scikit-learn, BLUPF90 suite programs, QMSim, Cytoscape, String, Genome Data Viewer,GS3	Machine Learning, Big Data Analytics, Quantitative Genetics, Genomics, Computer Vision, Statistical Modelling, Simulation

Miscellaneous

- **Languages:** English and Portuguese
- **Place of birth:** Duque de Caxias, RJ, Brazil
- **DOB:** 01/14/1991

References

References and additional information available upon request.