

Kerns, Karl

A. Education and Training:

B.S. 5/2014 Iowa State University, Ames, IA; Animal Science, Honors, Pre-Graduate
Ph.D. 2/2019 University of Missouri, Columbia, MO; Animal Science, Repro. Physiology
Postdoc. 8/2020 University of Missouri, Columbia, MO; Animal Science & Bioinformatics

B. Professional Appointments:

Research Positions and Employment

2021 - Iowa State University, Department of Animal Science, Assistant Professor, IA
2020 - 2021 Iowa State University, Department of Animal Science, Lecturer, IA
2019 - 2020 USDA NIFA Postdoctoral Fellow, Sutovsky/Behura/Xu Labs, MO
2014 - 2019 Miller and USDA NIFA Predoctoral Fellow, Sutovsky Lab, MO
Summer 2013 USDA ARS - Dr. David Guthrie Lab, Intern, Beltsville, MD
Summer 2011 Trans Ova Genetics, Sexed Semen and In-vitro Fertilization Lab Intern, IA
Summer 2012 Smithfield Premium Genetics, Management & Operations Intern, NC & TX
2011 – 2014 Iowa State University - Dr. Jason Ross Lab, Undergraduate Research, IA
2008 – 2013 University of Nebraska & Bellweather Farms, NE
2004 – 2014 International Boar Semen, IA

Affiliations

2022 - Iowa State University, Translational Artificial Intelligence Center (TrAC)
2021 - Iowa State University, Interdepartmental Genetics & Genomics Program
2021 - Iowa State University, Interdepartmental Bioinformatics & Computational Biology Program
2020 - University of Missouri, Division of Animal Sciences, Adj. Assistant Professor, MO

International Experiences

Summer 2013 University of Adelaide, Australia (Van Wettter Lab Internship)
Summer 2012 Intl Collegiate Agricultural Leadership Program to S.E. Asia

C. Honors and Awards:

Awards 2026 College of Agriculture and Life Sciences (ISU) – Early Achievement in Research
2025 Iowa State University (ISU) – Early Achievement in Teaching
2025 College of Agriculture and Life Sciences (ISU) – Early Achievement in Teaching
2024 ISU Provost's Office Miller Fellow
2024 Gamma Sigma Delta Early Career Research Mission Award
2022 CALS Innovation & Entrepreneurship Faculty Fellow
2020 SSR Postdoctoral Poster Competition – 1st Place
2020 USDA NIFA AFRI SSR Scientific Merit and Impact Award
2020 University of Missouri Distinguished Dissertation Award

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- 2019 USDA National Institute of Food and Agriculture Postdoctoral Fellow (**\$165,000**)
- 2019 Society for the Study of Reproduction (SSR) Trainee Travel Award (1 of 20)
- 2019 Missouri Life Sciences Week; Animal Biology, Health & Disease - 1st Place
- 2019 Iowa State University STATEment Maker, Academia Division
- 2018 Missouri Life Sciences Week Plant and Animal Physiology & Health, 2nd Place
- 2018 Animal Science Graduate Forum, University of Missouri - 1st Place PhD Oral
- 2017 National Swine Improvement Federation (NSIF) Graduate Student Award
- 2017 USDA NIFA AFRI SSR Scientific Merit and Impact Award
- 2017 SSR Trainee Platform Finalist (Top 1% of 600+ abstracts)
- 2017 USDA National Institute of Food and Agriculture Predoctoral Fellow (**\$95,000**)
- 2015 - '18 Larry Ewing Memorial Trainee Travel Award, SSR
- 2015 & '17 Douglas D. Randall Young Scientists Development Award, University of MO
- 2015 Animal Science Graduate Forum, University of Missouri, 2nd Place PhD Poster
- 2014 - '16 Miller Fellow, University of Missouri
- 2014 - '16 Graduate College Fellow, University of Missouri
- 2014 ISU CALS Senior Leadership Award
- 2013 Murray Wise Agricultural Entrepreneurship Award (\$10,000)
- 2013 Iowa Governor Branstad Agricultural Leadership Award

D. Publications:

Citation metrics (Google Scholar, 18 August 2026):

Total citations: 1,365

h-index: 20

i10-index: 30

Google Scholar: <https://scholar.google.com/citations?user=GtLSmB8AAAAJ&hl=en>

Scopus: <https://www.scopus.com/authid/detail.uri?authorId=56583899900>

ORCID: <https://orcid.org/0000-0001-7425-0131>

Peer-Reviewed Journal Articles

- 47. Jimmerson K, Jahnke M, Keller E, Putz A, Demetrio D, Dohlman T, **Kerns K***. 2026. Bovine In Vitro Fertilization Embryo Development Predicted by Capacitation-Induced Zinc Ion Flux and Acrosome Remodeling. *Int. J. Mol. Sci.* 27(15):6731. DOI: 10.3390/ijms27156731.
- 46. Rodriguez I, Weide T, Grote CE, Keller A, Bittencourt C, Schoelerman E, Shofner I, Keating AF, Redel BK, **Kerns K***. 2026. Effects of Fluorescence-Activated Cell Sorting on Boar Sperm Motility Subpopulations and In Vitro Embryo Development. *Mol. Reprod. Dev.* 93(6):e70123. DOI: 10.1002/mrd.70123.
- 45. Mahmood M, Weide T, **Kerns K***. 2026. Ferroptosis contributes to boar sperm deterioration during liquid semen storage. *Front. Vet. Sci.* 13:1816003. DOI: 10.3389/fvets.2026.1816003.

44. Keller A, Keller E, Vorwald M, Selsby J, Perry G, **Kerns K***. 2026. Comparative Proteomic Analysis of Bovine Spermatozoa Before and After Cryopreservation. *Front. Anim. Sci.* 7:1781535. DOI: 10.3389/fanim.2026.1781535.
43. Schoelerman E, Weide T, **Kerns K***. 2026. Evaluation of milk-based and egg-based semen extenders for extended storage of ram semen at 4°C. *Transl. Anim. Sci.* 10:txag018. DOI: 10.1093/tas/txag018.
42. Rodriguez I, Keller A, Jennett L, Johnson M, Shofner I, Mahmood M, Redel B, **Kerns K***. 2026. Capacitation-Induced Zinc Ion Flux and Sperm Plasma Membrane Remodeling Predict Porcine In Vitro Fertilization Cleavage Success. *Mol. Reprod. Dev.* 93(1):e70085. DOI: 10.1002/mrd.70085.
41. Weide T, Steibel J, **Kerns K***. 2026. Impact of Sorting and Catch Media on Porcine Sperm Motility, Capacitation, and Viability. *Andrology.* e70184. DOI: 10.1111/andr.70184.
40. Shofner I, Mills K, Weide T, Breitzman M, **Kerns K***. 2026. Zinc regulation of lipidome remodeling during boar sperm capacitation. *J. Anim. Sci.* 104:skag009. DOI: 10.1093/jas/skag009.
39. Fontes PLP*, Davis DB, Melo-Gonçalves L, Burato S, Smith MS, Stelzleni A, Fluharty FF, Stewart RL, Cooke RF, Bromfield JJ, Else-Keller A, **Kerns K**, Strickland L, Zoca SM. 2026. Overnutrition induced metabolic dysregulation and partially decreased semen quality in young beef bulls. *J. Anim. Sci.* 104:skag004. DOI: 10.1093/jas/skag004.
38. Garcia-Oliveros LN, Bozzi AR, Silva TOC, Nascimento FB, Oliveira TR, Miguel EL, Alves MBR, Rangel RB, Andrade AFC, Arruda RP, **Kerns K**, Celeghini ECC*. 2025. Phosphatidylserine translocation, cholesterol spatial distribution, and acrosome reaction reliably distinguish sperm capacitation from cryoinjury in bovine sperm. *Cryobiology.* 121:105302. DOI: 10.1016/j.cryobiol.2025.105302.
37. Keller A, Maus MK, Keller E, **Kerns K***. 2025. Deep Learning Classification Method for Boar Sperm Morphology Analysis. *Andrology.* 13(6):1615-1625. DOI: 10.1111/andr.13758.
36. Weide T, Mills K, Shofner I, Breitzman MW, **Kerns K***. 2024. Metabolic Shift in Porcine Spermatozoa during Sperm Capacitation-induced Zinc Flux. *Int. J. Mol. Sci.* 25(14):7919. DOI: 10.3390/ijms25147919.
35. Zigo M, Netherton J, Zelenková N, **Kerns K**, Kraus V, Postlerová P, Sutovsky P*. 2024. Bottom-up Approach to Deciphering the Targets of the Ubiquitin-Proteasome System in Porcine Sperm Capacitation. *Sci. Rep.* 14(1):20159.
34. Rishi JK, Timme K, White HE, **Kerns KC**, Keating AF*. 2024. Trajectory of Primordial Follicle Depletion is Accelerated in Obese Mice in Response to 7,12-Dimethylbenz[a]anthracene Exposure. *Biol. Reprod.* 111(2):483-495. DOI: 10.1093/biolre/ioae059.
33. Sutovsky P, Hamilton LE, Zigo M, Ortiz D'Avila Assumpção ME, Jones A, Tirpak F, Agca Y, **Kerns K**, Sutovsky M. 2024. Biomarker-based human and animal sperm phenotyping: the good, the bad and the ugly. *Biol. Reprod.* DOI: ioae061.
32. Keller A, **Kerns K**. 2023. Sperm Capacitation as a Predictor of Boar Fertility. *Mol. Reprod. Dev.* DOI:10.1002/mrd.23690

31. Rishi JK, Timme K, White HE, **Kerns KC**, Keating AF. 2023. Altered histone abundance as a mode of ovotoxicity during 7,12-dimethylbenz[a]anthracene exposure with additive influence of obesity. *Biol. Reprod.* DOI: 10.1093/biolre/ioad140. Published: 19 October 2023.
30. Silva CS, da Costa-e-Silva EV, Dode MAN, Cunha ATM, Garcia WR, Sampaio BFB, Silva JCB, Vaz FEM, **Kerns K**, Sutovsky P, Nogueira E. 2023. Semen quality of Nellore and Angus bulls classified by fertility indices and relations with field fertility in fixed-time artificial insemination. *Theriogenology*. 2023 Dec;212:148-156. DOI: 10.1016/j.theriogenology.2023.09.001
29. Zoca SM, Geary TW, Zezeski AL, **Kerns K**, Dalton JC, Harstine BR, Utt MD, Cushman RA, Walker JA, Perry GA. 2023. Bull field fertility differences can be estimated with in vitro sperm capacitation and flow cytometry. *Front. Anim. Sci.* 2023 May 2;4. DOI: 10.3389/fanim.2023.1180975
28. Zigo M, **Kerns K**, Sutovsky P. 2023. The Ubiquitin-Proteasome System Participates in Sperm Surface Subproteome Remodeling during Boar Sperm Capacitation. *Biomolecules*. 2023 Jun 15;13(6):996. DOI: 10.3390/biom13060996
27. Rishi JK, Timme K, White HE, **Kerns KC**, Keating AF. 2023. Obesity partially potentiates dimethylbenz[a]anthracene-exposed ovotoxicity by altering the DNA damage repair response in mice. *Biol. Reprod.* DOI: 10.1093/biolre/ioac218
26. Spooner-Harris M, **Kerns K**, Zigo M, Sutovsky P, Balboula A, Patterson A. 2022. A re-appraisal of mesenchymal-epithelial transition (MET) in endometrial epithelial remodeling. *Cell Tissue Res.* DOI: 10.1007/s00441-022-03711-z
25. Lawlor M, Zigo M, **Kerns K**, Cho IK, Easley CA, Sutovsky P. 2022. Spermatozoan Metabolism as a Non-Traditional Model for the Study of Huntington's Disease. *Intl J of Molc Sci.* DOI: 10.3390/ijms23137163
24. Zigo M, **Kerns K**, Sen S, Essien C, Oko R, Xu D, Sutovsky P. 2022. Zinc is a master-regulator of sperm function associated with binding, motility, and metabolic modulation during porcine sperm capacitation. *Commun. Biol.* DOI: 10.1038/s42003-022-03485-8
23. Sharif M, Hickl V, Juarez G, Di X, **Kerns K**, Sutovsky P, Bovin N, Miller DJ. 2022. Hyperactivation is sufficient to release porcine sperm from immobilized oviduct glycans. *Sci. Rep.* DOI: 10.1038/s41598-022-10390-x
22. Ortega MS, Rizo J, Drum J, O'Neil E, Pohler K, **Kerns K**, Schmelze A, Green J, Spencer T. 2022. Development of an Improved in vitro Model of Bovine Trophectoderm Differentiation. *Anim. Front.* DOI: 10.3389/fanim.2022.898808
21. Nogueira E, Tirpák F, Hamilton L, Zigo M, **Kerns K**, Sutovsky M, Kim J, Volkmann D, Jovine L, Taylor J, Schnabel R, Sutovsky P. 2022. A Non-Synonymous Point Mutation in a WD-40 Domain Repeat of EML5 Leads to Decreased Bovine Sperm Quality and Fertility. *Front. Cell Dev. Biol.* DOI: 10.3389/fcell.2022.872740
20. Zuidema D, **Kerns K**, Sutovsky P. 2021. An Exploration of Current and Perspective Semen Analysis and Sperm Selection for Livestock Artificial Insemination. *Animals*. DOI: 10.3390/ani11123563.

19. Chen P, Redel B, **Kerns K**, Spate L, Prather R. 2021. Challenges and Considerations during In Vitro Production of Porcine Embryos. *Cells*. DOI:10.3390/cells10102770
18. Momal S, **Kerns K**, Sutovsky P, Bovin N, Miller D. 2021. Progesterone Induces Porcine Sperm Release from Oviduct Glycans in a Proteasome-dependent Manner. *Reproduction*. DOI:10.1530/REP-20-0474
17. **Kerns K**, Jankovitz J, Robinson J, Minton A, Kuster C, Sutovsky P. 2020. Relationship between the length of sperm tail mitochondrial sheath and fertility traits in boars used for artificial insemination. *Antioxidants*. 9(11), 1033, DOI:10.3390/antiox9111033
16. **Kerns K**, Sharif M, Zigo M, Xu W, Hamilton LE, Sutovsky M, Ellersieck M, Drobnis EZ, Bovin N, Oko R, Miller D, Sutovsky P. 2020. Sperm Cohort-Specific Zinc Signature Acquisition and Capacitation-Induced Zinc Flux Regulate Sperm-Oviduct and Sperm-Zona Pellucida Interactions. *Int. J. Mol. Sci.* 21(6), 2121; DOI: 10.3390/ijms21062121
15. Zigo M, Maňásková-Postlerová P, Zuidema D, **Kerns K**, Jonáková V, Tůmová L, Bubeníčková F, Sutovsky P. 2020. Porcine model for the study of sperm capacitation, fertilization, and male fertility. *Cell Tissue Res.* 380(2):237-262. DOI: 10.1007/s00441-020-03181-1.
14. Kelsey KM, Zigo M, Thompson WE, **Kerns K**, Manandhar G, Sutovsky M, Sutovsky P. 2020. Reciprocal Surface Expression of Arylsulfatase A and Ubiquitin in Normal and Defective Mammalian Spermatozoa. *Cell Tissue Res.* 379, 561-576. DOI: 10.1007/s00441-019-03144-1
13. Mordhorst BR, **Kerns KC**, Schauflinger M, Murphy SL, Ross RM, Samuel MS, Wells KD, Green JA, Sutovsky P, Prather RS. 2019. Pharmacologic reprogramming designed to induce a Warburg Effect in porcine fetal fibroblasts decreases mitochondrial membrane potential and increases the quantity of autolysosomes, without impacting the overall quantity or size mitochondria. *Scientific Reports*. DOI:10.1038/s41598-019-45850-4
12. Sutovsky P, **Kerns K**, Zigo M, Zuidema D. 2019. Boar Semen Improvement through Sperm Capacitation Management, With Emphasis on Zinc Ion Homeostasis. *Theriogenology*. DOI: 10.1016/j.theriogenology.2019.05.037
11. Zigo M, Manaskova-Postlerova P, Jonakova V, **Kerns K**, Sutovsky P. 2019. Compartmentalization of the proteasome-interacting proteins during sperm capacitation. *Scientific Reports*. DOI:10.1038/s41598-019-49024-0
10. Zigo M, Manaskova-Postlerova P, Jonakova V, **Kerns K**, Sutovsky P. 2019. Ubiquitin-proteasome system participates in the de-aggregation of spermadhesion and DQH protein during boar sperm capacitation. *Reprod*. DOI: 10.1530/REP-18-0413
9. Zigo M, **Kerns K**, Sutovsky M, Sutovsky P. 2018. Modifications of the 26S proteasome during boar sperm capacitation. *Cell Tissue Res*. DOI:10.1007/s00441-017-2786-6
8. **Kerns K**, Zigo M, Sutovsky M, Drobnis E, Sutovsky P. 2018. Zinc Ion Flux of Mammalian Spermatozoa Capacitation. *Nature Communications*. DOI:10.1038/s41467-018-04523-y
7. **Kerns K**, Zigo M, Sutovsky P. 2018. Zinc: A Necessary Ion for Mammalian Sperm Fertilization Competency. *Int. J. Mol. Sci.* 19 (12), 4097. DOI:10.3390/ijms19124097
6. Chinchilla-Vargas J, **Kerns K**, Rothschild MF. 2017. Climatic and lunar effects on boar semen traits. *Anim Reprod Sci*. DOI:10.1016/j.anireprosci.2018.04.006

5. Walters EM, **Kerns K**, Burlak C. 2017. Xenotransplantation literature update, May/June 2017. *Xenotransplantation* 24(4): e12323. DOI: 10.1111/xen.12323
4. **Kerns K**, Hua A, Burlak C. 2017. Xenotransplantation literature update, January/February 2017. *Xenotransplantation* 24(2): e12304. DOI: 10.1111/xen.12304
3. **Kerns K**, Morales P, Sutovsky P. 2016. Regulation of Sperm Capacitation by the 26S proteasome: An emerging New Paradigm in Spermatology. *Biol Reprod* 94(5):117. DOI: 10.1095/biolreprod.115.136622
2. Burlak C and **Kerns KC**. 2015. Xenotransplantation literature update, January-February 2015. *Xenotransplantation* 22(2): 155-157. DOI: 10.1111/xen.12168
1. Burlak C, **Kerns KC**, Taylor RT. 2015. Xenotransplantation literature update, March-April 2015. *Xenotransplantation* 22(3): 236-238. DOI: 10.1111/xen.12171

Manuscripts Submitted / Under Review

6. Shofner I, LaVelle G, Olds J, Dziubinski M, Skiba S, Schoelerman E, Beachler T, **Kerns K***. Deep Learning, Label-free Sperm Plasma Membrane Integrity Diagnostics Across Mammalian Species. Submitted to Scientific Reports (02 Feb 2026). Submission ID: f732cf33-7d69-4e92-bac4-67c3bcfed5ee. Under consideration.
5. Mahmood M, **Kerns K***. High-accuracy 13-class deep learning classification model of boar sperm morphology by image-based flow cytometry. Submitted to Andrology (23 Feb 2026). Manuscript ID: 5744525. Under review.
4. Weide T, Koltes J, Steibel J, **Kerns K***. Differing mitochondrial abundance sperm subpopulations show divergent nuclear allele frequencies. Submitted to PLoS ONE. Submission ID: PONE-D-26-17361. Under consideration.
3. Schoelerman E, Hamilton LE, Zezeski AL, Sutovsky P, Geary TW, **Kerns KC***. Multiplex lectin nanopurification improves post-thaw bull spermatozoa viability, acrosome status, zinc ion capacitation status, and motility. Submitted to Molecular Reproduction & Development. Submission ID: 9991851. Under review.
2. Hamilton LE*, Zezeski AL, Sutovsky P, Geary TW, **Kerns K***. Lectin Nanopurification Improves Post-Thaw Bovine Semen Quality. Submitted to Biology of Reproduction (09 Apr 2026). Submission ID: BIOLRE-2026-0270.
1. Keller A, Gustafson M, Klare AR, Jimmerson K, Edgington K, Beachler T, Ferwerda N, **Kerns K***. Characterization of novel stallion sperm zinc signatures using image-based flow cytometry. Equine Veterinary Journal. ID: EVJ-OAR-25-210.

Preprints (Not Peer-Reviewed)

2. Anta E, Sosa F, Drum J, Lockhart K, Stoecklein K, Fallon L, Keller E, **Kerns K**, Ortega MS. 2026. Aggregation of misfolded proteins in the sperm head impairs preimplantation embryo development. bioRxiv 2026.06.01.728900.

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1. Park J, Ratka M, Biswas A, Shofner I, **Kerns K**, Sarkar A. 2026. Extracting deep learning based morphology segmentation footprint for boar sperm cells. bioRxiv.

Book Chapters

2. Zigo M*, Kerns K, Sutovsky P. 2025. Methods of Mammalian In Vitro Sperm Capacitation to Study Sperm Physiology. In: Spermatogenesis: Methods and Protocols. Methods in Molecular Biology, pp. 229-240. DOI: 10.1007/978-1-0716-4698-4_13.
1. Shofner I, Kerns K*. 2025. Improving the reproductive efficiency of boars: past, present, and future. In: Ross J (ed) Advances in Pig Breeding and Reproduction, Part 2: Reproduction. Burleigh Dodds Series in Agricultural Science, vol 152. Burleigh Dodds Science Publishing, Cambridge, UK, pp. 131-151. DOI: 10.19103/AS.2024.0137.11.

Peer-Reviewed Conference Proceedings

3. **Kerns K*** & Shofner I. 2026. Next-Generation Fertility Assessment in Boars and Bulls Using Single-Cell Phenotyping and Artificial Intelligence. Proceedings of the Brazilian Association of Animal Andrology Annual Meeting. Rev. Bras. Reprod. Anim. 50(1):117-122.
2. **Kerns K***. 2024. Sperm Attributes: Label-free and Image-based Flow Cytometry. National Association of Animal Breeders. Madison, Wisconsin.
1. **Kerns K*** & Sutovsky P. 2021. Bull Sperm Zinc Ion Flux as a Marker for the Acquisition of Fertilization Competency. Proceedings of the Brazilian Association of Animal Andrology Annual Meeting. Indaiatuba, São Paulo, Brazil.

E. Intellectual Property Disclosures and Patents:

4. "Mitochondrial Abundance-Based Sperm Selection and Genomic Characterization Assay." Invention Disclosure No. ISURF 06006. 2026.
3. "Deep learning boar sperm auto morphology scoring of image-based flow cytometry samples." Invention Disclosure No. ISURF 05255. 2021.
2. "Deep learning, label-free detection of infertile boar spermatozoa trained by lectin PNA." Invention Disclosure No. ISURF 05256. 2021.
1. Sperm Fertility Capacity Test & Decapacitating Supplement. Status: Provisional, May 2018, International U.S. Priority Application No. 62/673,356, University of Missouri IDF 18UMC071/18UMC072

F. Research Funding:

Total Funding (Entire Career, All Categories): \$5,379,653

Funding As PI (Extramural + Intramural) - \$2,409,307

Federal or State Association Funding

2025 - '26 \$68,358 - Iowa Pork Producers Association, Keeping Boars in the Game: Understanding Why Some Testes Quit Making Good Sperm
2024 - '25 \$69,139 - Iowa Pork Producers Association, Advancing Sow Farm Productivity: Proteomic Insights to Create Fertility Predictions
2023 - '25 \$60,000 - National Pork Board, Developing Future Pork Scholars
2022 - '23 \$74,977 - Iowa Pork Producers Association Proposal No. 155122
2022 - '24 \$60,000 - National Pork Board, Developing Future Pork Scholars
2022 - '25 \$550,000 - USDA AFRI NIFA, Award No. 2022-67015-36298
2020 - '22 \$650,000 - USDA NIFA SBIR Phase II, Award No. 2020-51103-32563
2020 - '22 \$75,734 - USDA NIFA, Award No. 2019-67012-34005
2019 - '20 \$100,000 - USDA NIFA SBIR Phase I, Award No. 2019-33610-29800
2019 - '20 \$89,266 - USDA NIFA Postdoctoral Fellowship, Award No. 2019-67012-29714
2017 - '19 \$95,000 - USDA NIFA Predoctoral Fellowship, Award No. 2017-67011-26023

Internal Grants as PI

2025 \$139,950 - CALS/HATCH, AI-Driven EmbryoScope+ for Livestock IVF Research (with C. Youngs, A. Keating)
2025 \$116,559 - CALS Equipment Grant for Spatial Transcriptomics Pipeline
2024 \$50,000 - Artificial Intelligence in the Classroom Miller Fellowship
2023 \$17,000 - Research Tool Revitalization – Microscopy Imaging for In Vitro Fertilization
2023 \$5,000 - Research Resource Access Mini Grant – Genomics of Sperm Subpopulations
2022 \$35,000 - CALS/HATCH Equipment Grant for a Sorting Flow Cytometer
2022 \$120,000 - CALS/HATCH Equipment Grant for a Spectral, Image-based Sorting Flow Cytometer
2022 \$5,000 - CALS Entrepreneurship Faculty Fellows
2021 \$69,244 - CoSPRT from VPR Office, ImageStream Mk II^X Dual Camera System
2020 \$14,040 - CoSPRT from VPR Office, THUNDER Computation Clearing System

Funding As Co-PI / Co-I / Consultant - \$2,414,510

Internal Grants as Co-PI - \$150,000

Mentored Fellowships (Awarded Directly to Student) = \$325,800

2026 - '28 \$100,000 - National Association of Animal Breeders Doak Graduate Fellowship (K. Hill)

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2025 - '27 \$100,000 - National Association of Animal Breeders Doak Graduate Fellowship (M. Ratka)

2022 - '25 \$125,800 - HEC Pakistan, US-Pakistan Knowledge Corridor Fellowship (M. Mahmood)

Gifts / Donations to Research Program = \$189,994

Fee-For-Service Revenue = \$140,042

Teaching Grants (Not Included in Research Support Above)

2026 - '28 \$100,000 - Division of Academic Affairs Transformative Initiatives, AI-Enabled Tutoring and Applied Learning in CALS (with E. Ebrahimi)

2023 - '24 \$50,000 - Miller Faculty Fellowship (AI Call), Tailored AI Tutoring for Improved Student Outcomes (with T. Brumm)

G. Invited Presentations:

Invited Talks and Seminars

47. Artificial Intelligence in the Evaluation of Swine Semen. Brazilian Association of Animal Andrology Annual Meeting. Indaiatuba, São Paulo, Brazil (2026)
46. Next-generation Fertility Assessment in Boars and Bulls Using Single-cell Phenotyping and Artificial Intelligence. Brazilian Association of Animal Andrology Annual Meeting. Indaiatuba, São Paulo, Brazil (2026)
45. The Current State-of-the-Art and Future of Boar Sperm Fertility Diagnostics. Reicks Veterinary Research and Consulting Annual Meeting. Sleepy Eye, Minnesota (2026)
44. Label-Free, Deep Learning Image-Based Flow Cytometry Enables Automated Analysis of Sperm Function and Morphology. American Association of Andrology Annual Meeting. Scottsdale, Arizona (2026)
43. Flow Cytometric Sorting Alters Capacitation Progression of Boar Sperm and Increases Polyspermy During In Vitro Fertilization. North American Testis Workshop. Scottsdale, Arizona (2026)
42. Keynote: Is Sperm Morphology Enough? Rethinking Fertility Assessment in Bull Semen. Australian Veterinary Association's Australian Cattle Veterinarians Conference. Brisbane, Queensland, Australia (2026)
41. Next-Generation Approaches to Bull Sperm Fertility Assessment. Australian Veterinary Association's Australian Cattle Veterinarians Conference. Brisbane, Queensland, Australia (2026)
40. Invited Master Class Instructor: BULLCHECK™ Sperm Morphology Masterclass. Australian Veterinary Association's Australian Cattle Veterinarians Conference. Brisbane, Queensland, Australia (2026)
39. Artificial Intelligence in Agriculture: What it is, What it can do, and What Iowa State University is Working on. Southeast Iowa Agricultural Research Association Annual Meeting. Crawfordsville, Iowa (2026)

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38. Creating a Course-Aligned AI Avatar Tutor for Anatomy and Physiology Lab Education. Iowa American Physiological Society Conference. Ames, Iowa (2025)
37. Creating a Course-Aligned AI Avatar Tutor for Anatomy and Physiology Lab Education. Iowa State University, Department of Animal Science Seminar Series. Ames, Iowa (2025)
36. Label-free Fluorescence Analysis of Sperm. Bovine Tech Days. Eching, Germany (2025)
35. From Single Cells to Breeding Success: Modern Approaches in Boar Sperm Quality and Fertility Prediction. St. Louis, Missouri (2025)
34. Precision Reproduction: New Technologies Shaping Livestock Fertility. National Block and Bridle Convention. Ames, Iowa (2025)
33. Sperm Attributes: Label-free and Image-based Flow Cytometry. National Association of Animal Breeders. Madison, Wisconsin (2024)
32. Proteome Differences Between Fresh and Frozen Bull Sperm. Roy A. Wallace Symposium. Visalia, California (2024)
31. High-throughput, Single Cell Phenotyping by Image-based Flow Cytometry. Iowa State University, Department of Genetics, Development, and Cell Biology Research Day. Ames, Iowa (2024)
30. High-throughput, Label-free Boar Sperm Fertility Phenotyping. National Swine Improvement Federation. Nashville, Tennessee (2024)
29. Training the Next Generation of Boar Stud Managers. Minitube Tech Days. Verona, WI (2024)
28. The Present and Future of Boar Fertility Testing. Iowa Pork Industry Center Webinar Series (2023)
27. Current and Future State-of-the-Art Methods for Assessing Boar Fertility. Annual Meeting of American Society of Animal Science. Albuquerque, NM (2023)
26. Bull Fertility Evaluation: Omics & Emerging Technologies. National Center for Applied Reproduction and Genomics, Focus on the Male Webinar Series - Virtual (2023)
25. The Present & Future of Boar Fertility Prediction. Iowa Swine Day. Ames, IA (2023)
24. Sperm Capacitation Patterns as Predictor of Boar Fertility. International Conference on Pig Reproduction. Ghent, Belgium (2023)
23. Improving Boar Reproductive Performance through Microfused EO Supplementation. Iowa Pork Congress. Des Moines, IA (2023)
22. Boar Fertility Prediction of Today and Tomorrow. American Technical Meeting for Specialists in Swine Reproduction. Minneapolis, MN (2022)
21. Using Reproductive Technologies to Advance Genetic Progress Across the Animal Production Chain. Iowa State University, Department of Animal Science, Animal Breeding & Genetics Seminar Series. Ames, Iowa (2022)
20. Use of Deep Learning, Artificial Intelligence for Sperm Quality and Health Assessments. Roy A. Wallace Memorial Symposium on Bovine Reproduction. Boise, ID (2022)
19. Sperm Zinc Ion Flux in Bulls. Roy A. Wallace Memorial Symposium on Bovine Reproduction. Boise, ID (2022)

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18. Artificial Intelligence Models to Detect Male-factor Sub/infertility. Association for Applied Animal Andrology. Bologna, Italy (2022)
17. Semen Evaluation Technologies: Not as Far-Fetched as You Think? Midwest ASAS. Omaha, NE (2022)
16. Deep Learning Classification of Boar Sperm Morphology. Society for the Study of Reproduction Annual Meeting. St. Louis, MO (2021)
15. Boar Sperm Zinc Ion Flux as a Marker for the Acquisition of Fertilization Competency. Boar Stud Manager Conference. St. Louis, MO (2021)
14. Bull Sperm Zinc Ion Flux as a Marker for the Acquisition of Fertilization Competency. Brazilian Association of Animal Andrology. Campo Grande, Brazil (2021; *online due to COVID*).
13. Opening the Black Box of Fertility Prediction. Midwest American Society of Animal Science Swine Translational Symposium. Online (2021)
12. Zinc Ion Fluxes on the Pathway to Mammalian Sperm Fertilization Competency. Iowa State University Department Seminar Series (2021)
11. Artificial Intelligence Analysis of the Mammalian Sperm Zinc Signature Predicts Male-factor Subfertility. Oral ePoster Competition. Society for the Study of Reproduction Annual Meeting, Online. (2020)
10. Sperm Capacitation-induced Zinc Efflux is Necessary for Increased Proteasomal Activity and Release from Oviduct Glycans of the Sperm Reservoir. Flash Oral Talk. Society for the Study of Reproduction Annual Meeting, San Jose, CA (2019)
9. Zinc Signature of Mammalian Sperm Capacitation, Oral Platform Presentation (Top 1% of 600+ abstracts). Society for the Study of Reproduction Annual Meeting, Washington, DC (2017)
8. Artificial Insemination and the Porcine Reproductive Toolbox. Producer Workshop, Eldon, MO (2018)
7. From A(xoneme) to Z(inc): A New Paradigm for Boar Spermatozoa Fertility, Function, and Storage to Maximize Genetic Usage. North American PRRS Symposium on PRRS, Emerging & Foreign Animal Diseases and National Swine Improvement Federation Conference, Chicago, IL (2017)
6. Dual Propose with Dual Benefit: A One Health Research Perspective for Iowa, Luncheon Keynote, Iowa One Health Conference, Iowa City, IA (2017)
5. Unique Zinc Signature of Boar Capacitation. International Conference on Pig Reproduction, Columbia, MO (2017)
4. Innovation and Entrepreneurship in Academia, Oral Presentation & Panel, Borlaug Dialogue International Symposium Iowa Ag Leaders Dinner, World Food Prize, Des Moines, IA (2016)
3. Discovery and Validation of Boar Sperm Quality and Sperm Capacitation Biomarkers Using Next Generation Image-based Flow Cytometry. Midwest Boar Stud Managers Conference, St. Louis, MO (2016)
2. Capacitation-induced Changes of Candidate Proteasomal Interactors ADAM5 and NEDL2, Measured by Image-based Flow Cytometry in Porcine Spermatozoa. Oral Flash Talk, Society for the Study of Reproduction Annual Meeting, San Diego, CA (2016)

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1. Localization of Candidate Proteasomal Interactors ADAM5 and NEDL2 in Porcine Spermatids and Spermatozoa. VIII International Conference on Boar Semen Preservation, IL (2015)

Invited International Courses

1. Kerns K*, Shofner I. Functional Sperm Biology and Emerging Technologies in Fertility. May–July 2026. International graduate course organized by the Brazilian Association of Animal Andrology (ABRAA) with support from CAPES/PAEP. Hybrid format: São Paulo and online. Lead instructor, 4 of 5 sessions (15 contact hours, 1 graduate credit, 72 attendees).

H. Abstracts and Conference Presentations:

71. Keller A, Montes C, Walley JW, **Kerns K***. 2026. Distinct Proteomic Profiles in Non-Capacitated and Capacitated Boar Sperm Linked to Pregnancy Rate and Litter Size. Society for the Study of Reproduction Annual Meeting. Indianapolis, Indiana.
70. Rodriguez I, Weide T, Grote CE, Albin L, Keller A, Schoelerman E, Shofner I, Keating AF, Redel B, **Kerns K***. 2026. Flow Cytometric Sorting Alters Subpopulations of Boar Sperm Motility and Increases Polyspermy During In Vitro Fertilization. Society for the Study of Reproduction Annual Meeting. Indianapolis, Indiana.
69. Shofner I, **Kerns K***. 2026. A Multi-Biomarker Label-Free Framework for Boar Sperm Fertility Diagnostics. Society for the Study of Reproduction Annual Meeting. Indianapolis, Indiana.
68. Pigg R, Weide T, Rodriguez I, **Kerns K***. 2026. Flow Cytometric Sorting Modifies Boar Sperm Phenotype and PLC ζ Head Signal Heterogeneity. Society for the Study of Reproduction Annual Meeting. Indianapolis, Indiana.
67. Weide T, Koltes J, Steibel J, **Kerns K***. 2026. Mitochondrial Abundance-Defined Sperm Subpopulations Exhibit Divergent Nuclear Allele Frequencies in Boars. Society for the Study of Reproduction Annual Meeting. Indianapolis, Indiana.
66. Zigo M*, Martín Hidalgo D, **Kerns K**, Gervasi MG, Sutovsky P. 2026. Transient Boar Sperm Starvation Accelerates Capacitation Associated Changes during Porcine Sperm In Vitro Capacitation. Society for the Study of Reproduction Annual Meeting. Indianapolis, Indiana.
65. McAnally BE, Ross CE, Ahern DF, Byrd MH, Musa J, Else-Keller A, **Kerns K**, White BR, Lents CA, Brito LF, Johnson JS, Desaulniers AT*. 2026. Effects of In Utero Heat Stress and Genomic Selection for Heat Tolerance on Semen Quality and Sperm Physiology in Boars. Society for the Study of Reproduction Annual Meeting. Indianapolis, Indiana.
64. Ratka M, Weide T, **Kerns K***. 2026. Biomarker-Informed Flow Cytometric Sorting for Selection of Morphologically Normal Sperm. American Dairy Science Association Annual Meeting. Madison, Wisconsin.
63. **Kerns K***, Shofner I, Else-Keller A, Mahmood M. 2026. Label-Free Deep Learning Image-based Flow Cytometry Accurately Predicts Fluorescent Biomarker-Based Boar Sperm Functional Integrity and Morphology. International Conference on Animal Reproduction. Obihiro, Hokkaido, Japan.

62. Bebb DL, Johnson AK*, Millman ST, **Kerns KC**, Genschel U. 2026. Why Are Multiplication Gilts Not Selected for Entry into the Sow Herd? Midwest Section American Society of Animal Science Annual Meeting. Omaha, Nebraska.
61. Grote CE, Rodriguez IC, Nold-Schoelerman ER, Brockman ME, **Kerns KC**, et al. 2026. Investigating the impact of albumin on porcine oocyte competence. International Embryo Technology Society. Reprod. Fertil. Dev. 38(1):RDv38n1Ab174.
60. Nold-Schoelerman E, Zezeski AL, Hamilton LE, Sutovsky P, Geary TW, **Kerns K**. 2026. Post-thaw nanoparticle sorting of bull sperm improves cryopreservation outcomes. International Embryo Technology Society. Reprod. Fertil. Dev. 38(1):RDv38n1Ab45.
59. Bebb D, Millman ST, Genschel U, Scott R, **Kerns K**, Johnson AK. 2026. How Does an Enrichment Toy at the Time of Mixing Sows Support Oral-nasal-facial Behaviors? American Society of Animal Science. J. Anim. Sci. 104(Suppl. 3):skag107.348.
58. Bebb D, Millman ST, Genschel U, **Kerns K**, Johnson AK. 2026. What Animal-based Outcomes Exclude Gilts from Entering the Breeding Herd? American Society of Animal Science. J. Anim. Sci. 104(Suppl. 3):skag107.374.
57. Tirpak F, Hamilton L, Sultana T, Schnabel R, Rissman J, **Kerns K**, Zigo M, Sutovsky M, Sutovsky P. 2025. Investigating the Genetic Origins of Sperm Nuclear Vacuoles and Their Impact on Bovine Reproductive Outcomes. Society for the Study of Reproduction. Washington, D.C.
56. Fontes P, Davis D, Goncalves L, Smith M, Burato S, Stelzleni A, Fluharty F, Stewart L, Cooke R, Bromfield J, Keller A, **Kerns K**, Zoca S. 2025. Reproductive consequences of young sire overnutrition in the bovine: I) Systemic metabolic and endocrine profile. American Society of Animal Science (ASAS) Annual Meeting. Hollywood, FL.
55. Fontes P, Davis D, Goncalves L, Smith M, Burato S, Stelzleni A, Fluharty F, Stewart L, Cooke R, Bromfield J, Keller A, **Kerns K**, Zoca S. 2025. Reproductive consequences of young sire overnutrition in the bovine: II) Testicular function and sperm quality. American Society of Animal Science (ASAS) Annual Meeting. Hollywood, FL.
54. Mahmood M, **Kerns K***. 2024. Unmixing the [Fluorescent] Spectrum of Sperm Cellular Health Utilizing High-Parameter Image-based, Spectral Flow Cytometry. International Conference on Boar Semen Preservation. Vic, Spain.
53. Rodriguez I, Keller A, Jennett L, Johnson M, Shofner I, Weide T, **Kerns K***. 2024. Boar Sperm Capacitation Status as Predictor of IVF Cleavage Rate. International Conference on Boar Semen Preservation. Vic, Spain.
52. Keller A, Maus MK, Keller E, **Kerns K***. 2024. Deep Learning Classification Method for Boar Sperm Morphology Analysis. Society for the Study of Reproduction. International Conference on Boar Semen Preservation. Vic, Spain.
51. Mahmood M, **Kerns K***. 2024. Unmixing the [Fluorescent] Spectrum of Sperm Cellular Health Utilizing High-Parameter Image-based, Spectral Flow Cytometry. Society for the Study of Reproduction. Dublin, Ireland.

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50. Keller A, Perry G, **Kerns K**. 2024. Phenotyping Differentially Abundant Proteins in Cryopreserved vs Fresh Bull Sperm. Society for the Study of Reproduction. Dublin, Ireland.
49. Rodriguez I, Keller A, Jennett L, Johnson M, Shofner I, Weide T, **Kerns K***. 2024. Boar Sperm Capacitation Status as Predictor of IVF Cleavage Rate. Society for the Study of Reproduction. Dublin, Ireland.
48. Shofner I, **Kerns K***. 2024. Deep Learning, Label-free Sperm Plasma Membrane Integrity Diagnostics. Society for the Study of Reproduction. Dublin, Ireland.
47. Zezeski AL, Gonzalez-Berrios CL, **Kerns KC**, Geary TW*. 2024. Capacitation Signatures in Fresh and Cryopreserved Bovine Sperm. Society for the Study of Reproduction. Dublin, Ireland.
46. Anta Galvan E, **Kerns KC**, Ortega MS. 2024. Paternal Aggresome Content is Associated with Increased Reactive Oxygen Species and Impaired Mitophagy during Preimplantation Development of Bovine Embryos. Society for the Study of Reproduction. Dublin, Ireland.
45. Hamilton LE, Zezeski AL, Gonzalez-Berrios CL, **Kerns KC**, Sutovsky P, Geary TW. 2024. Validating Sperm Surface Lectin Targets for Use in the Nanopurification of Bull Semen. Society for the Study of Reproduction. Dublin, Ireland.
44. Zigo M, **Kerns K**, Sutovsky P. 2024. Proteins of Huntington's Disease Pathway Participate in Pig Sperm Capacitation. Society for the Study of Reproduction. Dublin, Ireland.
43. Keller A, Perry G, **Kerns K**. 2024. Phenotyping Differentially Abundant Proteins in Cryopreserved vs Fresh Bull Sperm. National Association of Animal Breeders. Madison, Wisconsin.
42. Nold E, Hamilton LE, Zezeski AL, Gonzalez-Berrios CL, **Kerns K***, Sutovsky P, Geary TW. 2024. Validating Sperm Surface Lectin Targets for Use in the Nanopurification of Bull Semen. National Association of Animal Breeders. Madison, Wisconsin.
41. Rodriguez I, Keller A, Jennett L, Johnson M, Shofner I, Weide T, **Kerns K***. 2024. Sperm Capacitation Status as Predictor of IVF Cleavage Rate. Society for the Study of Reproduction. National Association of Animal Breeders. Madison, Wisconsin.
40. Shofner I, **Kerns K***. 2024. Deep Learning, Label-free Sperm Plasma Membrane Integrity Diagnostics. Society for the Study of Reproduction. National Association of Animal Breeders. Madison, Wisconsin.
39. Mahmood M, **Kerns K***. 2024. Unmixing the [Fluorescent] Spectrum of Sperm Cellular Health Utilizing High-Parameter Image-based, Spectral Flow Cytometry. National Association of Animal Breeders. Madison, Wisconsin.
38. Anta Galvan E, **Kerns K**, Ortega MS. 2024. Paternal Aggresome Content is Associated with Increased Reactive Oxygen Species and Impaired Mitophagy during Preimplantation Development of Bovine Embryos. National Association of Animal Breeders. Madison, Wisconsin.
37. Mahmood M & **Kerns K**. Cross-Species Sperm Proteomic Analysis for Human Male Fertility Model Establishment. Society for the Study of Reproduction. Ottawa, Canada (2023)

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36. Jimmerson K, Jahnke M, Keller E, Putz A, Demetrio D, **Kerns K***, Dohlman T*. Use of Sperm Capacitation Biomarkers to Predict In-Vitro Embryo Production Outcomes. Annual Meeting of the American Embryo Transfer Association. Orlando, FL (2023)
35. Jimmerson K & **Kerns K**. Sperm Zinc Efflux and Overall Capacitation Rate is Affected by Bicarbonate Concentration in Bull Sperm in vitro Capacitation Media. Society for the Study of Reproduction. Ottawa, Canada (2023)
34. Shofner I, Weide T, Breitzman M, Jimmerson K, **Kerns K**. Lipidomics of Mammalian Sperm Capacitation. Society for the Study of Reproduction. Ottawa, Canada (2023)
33. Keller A, Keller E, Perry G, **Kerns K**. Identification of Distinct Proteome Differences Between Fresh and Cryopreserved Bull Spermatozoa. Society for the Study of Reproduction. Ottawa, Canada (2023)
32. Weide T, Shofner I, Keller A, Breitzmann M, **Kerns K**. Metabolism of Mammalian Sperm Capacitation. Society for the Study of Reproduction. Ottawa, Canada (2023)
31. Garcia-Oliveros LN, Keller A, Jimmerson K, Keller E, Maus M, Jennett L, Johnson M, Martins MM, Celeghini ECC, **Kerns K**. Sperm Biomarker-reflected Health Status Differs by Morphology Classification. Society for the Study of Reproduction. Ottawa, Canada (2023)
30. Zigo M, **Kerns K**, Putz A, Steible JP, Sharafi M, Sutovsky P. Bull Sperm Zinc Signature Predictability of Sire Conception Rate. Society for the Study of Reproduction. Ottawa, Canada (2023)
29. Hamilton L, Zezeski A, Baldrighi JM, Assumpcao MEOA, **Kerns K**, Sutovsky P, Geary T. The Sweet Side of Sperm: Enriching bovine semen doses using nanoparticle selection that targets the sperm glycocalyx. Ottawa, Canada (2023)
28. Zigo M, **Kerns K**, Ahlering P, Sutovsky P. Comparison of Human and Porcine Sperm Zincoproteomes with Focus on Clinical and Evolutionary Implications. Society for the Study of Reproduction. Ottawa, Canada (2023)
27. Deep Learning, Artificial Intelligence Methods to Predict Boar Sperm Acrosome Health. Keller A, **Kerns K**. Society for the Study of Reproduction. Spokane, WA (2022)
26. Stallion Sperm Zinc Signature. Gustafson M, Keller A, Ramirez-Klare A, Grimm K, Reno K, Beachler T, Ferwerda N, **Kerns K**. Society for the Study of Reproduction. Spokane, WA (2022)
25. Goat Sperm Zinc Signature. Grimm K, Keller A, Smith J, Dohlman T, **Kerns K**. Society for the Study of Reproduction. Spokane, WA (2022)
24. Canine Sperm Zinc Signature. Ramirez-Klare A, Gustafson M, Grimm K, Keller A, Smith J, Wu E, Beachler T, **Kerns K**. Society for the Study of Reproduction. Spokane, WA (2022)
23. Deep Learning, Artificial Intelligence Methods to Predict Boar Sperm Acrosome Health. Keller A, **Kerns K**. Iowa Pork Congress. Des Moines, IA (2022) (*Student received 2nd place.*)
22. Bull Field Fertility Differences can be Estimated with In Vitro Sperm Capacitation and Flow Cytometry. Zoca S, Geary T, Zezeski A, **Kerns K**, Dalton J, Harstine B, Utt M, Cushman R, Walker J, Perry G. Society for the Study of Reproduction. St. Louis, MO (2021)

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21. An Exploration of Semen Analysis and Sperm Selection for Livestock Artificial Insemination. Zuidema D, **Kerns K**, Zigo M, Hamilton L, Sutovsky P. National Association of Animal Breeders. Online due to COVID-19 (2021)
20. Male Infertility and Semen Evaluation: Andrology in the Age of Precision Medicine and Agriculture. Sutovsky P, Zuidema D, **Kerns K**, Zigo M, Hamilton L, Sutovsky M. Arnold Theiler Memorial Lecture, University of Pretoria, South Africa (2021)
19. A deleterious Single Nucleotide Polymorphism in the TAPE domain of EML5 is associated with decreased fertility in Angus bulls. Hamilton L, Nogueira E, Tirpak F, Zigo M, **Kerns K**, Sutovsky M, Kim J, Volkmann D, Jovine L, Taylor J, Schnabel R, Sutovsky P. Society for the Study of Reproduction. St. Louis, MO (2021)
18. A Reappraisal of Mesenchymal-Epithelial Transition in Endometrial Epithelialization. Spooner M, **Kerns K**, Zigo M, Sutovsky P, Patterson A. Society for the Study of Reproduction. St. Louis, MO (2021)
17. Participation of the ubiquitin-proteasome system in sperm surface proteome remodeling during capacitation. Zigo M, **Kerns K**, Sutovsky P. Society for the Study of Reproduction. St. Louis, MO (2021)
16. Artificial Intelligence Analysis of the Mammalian Sperm Zinc Signature Predicts Male-factor Subfertility. **Kerns K**, Kramer S, Zigo M, Minton A, Xu D, Behura S, Sutovsky P. Society for the Study of Reproduction Annual Meeting. Virtual due to COVID (2020)
15. Zinc Interacting Profile Changes During In Vitro Capacitation of Boar Spermatozoa. Zigo M, **Kerns K**, Sen S, Essien C, Xu D, Sutovsky P. Society for the Study of Reproduction Annual Meeting. Virtual due to COVID (2020)
14. Sperm Tail Mitochondrial Sheath Length Correlates with Bull Fertility Outcomes. Grace Wiley, Erikliis Nogueira, Camile Sanches, **Karl Kerns**, Peter Sutovsky. Society for the Study of Reproduction Annual Meeting, San Jose, CA (2019)
13. Impact of High Fat Diet-Induced Obesity on Ovarian DNA Damage Repair Proteins In Rats. Bailey C. McGuire, María E. González Alvarez, **Karl Kerns**, Peter Sutovsky, Aileen F. Keating. Society for the Study of Reproduction Annual Meeting, San Jose, CA (2019)
12. Impact of High Fat Diet-Induced Obesity on Ovarian Chemical Metabolism Proteins in Rats. María E. González Alvarez, Bailey C. McGuire, **Karl Kerns**, Peter Sutovsky, Aileen F. Keating. Society for the Study of Reproduction Annual Meeting, San Jose, CA (2019)
11. Identification of a Rare, Fertility Affecting Mutation in Bovine Eml5. Michal Zigo, Erikliis Nogueira, **Karl Kerns**, Miriam Sutovsky, Jaewoo Kim, Filip Tirpak, Thomas E. Spencer, Jeremy F. Taylor, Robert D. Schnabel, Peter Sutovsky. Society for the Study of Reproduction Annual Meeting, San Jose, CA (2019)
10. Sire Influences Gene Expression in Trophoblast Cell Markers In Vitro. M. Sofia Ortega, **Karl Kerns**, Thomas E. Spencer. Society for the Study of Reproduction Annual Meeting, San Jose, CA (2019)

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9. A(xoneme) to Z(inc): New Paradigm for Mammalian Sperm Fertilization Competency. **Karl Kerns**, Michal Zigo, Wei Xu, Erma Drobnis, Lauren Hamilton, Miriam Sutovsky, Richard Oko, Peter Sutovsky. Yanagimachi 90th Birthday Symposium, Honolulu, HI (2018)
8. Boar Sperm Zinc Ion Fluctuations from Spermiogenesis to Fertilization. **Karl Kerns**, Michal Zigo, Peter Sutovsky. Biennial Conference of the Association for Applied Animal Andrology, New Orleans, LA (2018)
7. Identification of Seminal Parameters Predictive of Conception Rates in Bos Indicus Cows Submitted to Timed-Artificial Insemination. E Nogueira, C Sanches, EV COSTA E SILVA, A Mendes, MAN Dode, G Wiley, K Kerns, P Sutovsky. 32nd Annual Meeting of the Brazilian Embryo Technology Society. (2018)
6. Mammalian Sperm Zinc Ion Fluctuations from Spermiogenesis to Fertilization. **Karl Kerns**, Michal Zigo, Peter Sutovsky. Society for the Study of Reproduction Annual Meeting, New Orleans, LA (2018)
5. Ubiquitin-Proteasome System (UPS) Regulates Spermadhesin Release During Boar Sperm Capacitation. Michal Zigo, Pavla Postlerova, Vera Jonakova, Karl Kerns, Peter Sutovsky. Society for the Study of Reproduction Annual Meeting, New Orleans, LA (2018)
4. New Insights into the Involvement of Ubiquitin-Proteasome System (UPS) in Boar Sperm Capacitation. Michal Zigo, **Karl Kerns**, Miriam Sutovsky, Peter Sutovsky. Society for the Study of Reproduction Annual Meeting, Washington, DC (2017)
3. Proteasomal Activity is Necessary for Porcine Sperm Release from Immobilized Oviduct Glycans. Momal Sharif, **Karl Kerns**, Peter Sutovsky, David Miller. Society for the Study of Reproduction Annual Meeting, Washington, DC (2017)
2. Capacitation-induced Changes of Candidate Proteasomal Interactors ADAM5 and NEDL2, Measured by Image-based Flow Cytometry in Porcine Spermatozoa. **Karl Kerns**, Miriam Sutovsky, Peter Sutovsky. Society for the Study of Reproduction Annual Meeting, San Diego, CA (2016)
1. Localization of Candidate Proteasomal Interactors ADAM5 and NEDL2 in Porcine Spermatozoa. **Karl Kerns**, Michal Zigo, Miriam Sutovsky, Peter Sutovsky. Society for the Study of Reproduction Annual Meeting, San Juan, PR (2015)

I. Teaching:

Courses Taught and Course Contributions, 2011 – 2026 (at ISU since August 2020)

2026	AnS 4560X – Instructor, Entrepreneurship & Opportunity Recognition in Animal & Animal Product Enterprises
2026	AnS 2140L – Instructor (Spring)
2025	AnS 2140L – Instructor (Fall)
2025	AnS 5490 – Team Instructor (Fall)
2025	AnS 2140L – Instructor (Spring)
2024	AnS 2140L – Instructor (Fall)
2024	AnS 5490 – Team Instructor (Fall)
2024	AnS 490I – Instructor (Spring)

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2024	AnS 214L – Instructor (Spring)
2024	BBMB 5900 – Instructor, Special Topics: Image-based Flow Cytometry Analysis
2023	AnS 5490 – Team Instructor (Fall)
2023	AnS 214L – Instructor (Fall)
2023	AnS 214L – Instructor (Spring)
2023	AnS 211 – Guest Lecturer (Spring)
2022	AnS 633 – Instructor (Fall)
2022	AnS 214L – Instructor (Fall)
2022	AnS 549 – Guest Lecturer (Fall)
2022	Econ 334 – Course Contributor (Fall)
2022	AnS 211 – Guest Lecturer (Fall)
2022	AnS 214L – Instructor (Spring)
2021	AnS 214L – Instructor (Fall)
2021	AnS 211 – Guest Speaker (Fall)
2021	AnS 211 – Guest Speaker (Spring)
2021	AnS 214L – Instructor (Spring)
2021	AnS 190 – Coordinator (Spring)
2021	AnS 211 – Guest Speaker (Spring)
2020	AnS 211 – Guest Speaker (Fall)
2020	AnS 214L – Co-Taught (Fall)

J. Service and Professional Activities:

University and Departmental Service

2026	CALS AI Research & Teaching Task Force – Member
2026	University Teaching Awards Committee (Provost Office) – Member
2025 -	Department of Animal Science IT Committee – Co-Chair
2025 -	Interdepartmental Genomics and Genetics (IGG) – Supervisory Committee
2024	Research and Innovation Dean Search Committee – Member
2024 -	Interdepartmental Bioinformatics and Computational Biology (BCB) – Supervisory Committee
2023 - '26	Iowa State University Biotechnology Council – Member
2023 -	Interdepartmental Genetics & Genomics (IGG) – Curriculum Committee
2023 - '25	Graduate Education and Affairs Committee, Department of Animal Science
2023 -	Interdepartmental Bioinformatics and Computational Biology (BCB) – Admissions Committee
2022 -	CALS CASTLE (Committee on the Advancement of Student Technology for Learning Enhancement) – Member
2022 -	Majors of the Future, Department of Animal Science, ISU – Member
2022 -	Fostering Student Innovation, Department of Animal Science, ISU – Member
2022	Department Chair Search Committee - Member
2022	John Patience Nutrition Chair Search Committee - Member

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- 2022 - ANS CASTLE (Committee on the Advancement of Student Technology for Learning Enhancement) - Member
- 2021 - Association of Graduate Animal Scientists - Adviser
- 2021 - Chuckwagon/Graduate Breakfasts – Member
- 2021 Seminar Committee – Member
- 2021 College Innovation Fellows Committee – Member
- 2020 ADVANCE Department Review Task Force – Member

Leadership Experiences

- 2025 - '26 Sigma Xi, The Scientific Society – President
- 2025 - Department of Animal Science IT Committee – Co-Chair
- 2024 - '25 Sigma Xi, The Scientific Society – President-elect
- 2021 - Gamma Sigma Delta – Vice President
- 2021 - Association of Graduate Animal Scientists – Adviser
- 2019 USDA ARS Meat Animal Research Center Swine Focus Group – Member
- 2017 - '20 Interdisciplinary Reproduction & Health Group Trainee Assoc. – Treasurer
- 2017 International Conference on Pig Reproduction – Local Organizing Committee
- 2013 Bacon Expo – Founding Business Manager
- 2012 - '14 Ag Entrepreneurship Initiative - Student Advisory Team ('12- '13)
- 2012 - '13 Student Federation for Agriculture (Ag Advocates) – Founding Treasurer
- 2010 - '14 VEISHEA, Inc. - General Co-Chair (2014); General Business Manager (2013)
- 2010 - '12 College of Agriculture & Life Sciences Ambassador – Alumni Committee

Professional & Honor Memberships

- 2023 - Society for the Study of Reproduction Development Committee (SSR; 2023 – '24, Committee; 2024 – '25, Vice-Chair; 2025 – '26, Chair; 2026 – '27, Past Chair)
- 2022 & '24 Society for the Study of Reproduction (SSR) – Abstract Reviewer
- 2021 - Gamma Sigma Delta (President, 2023)
- 2021 - Sigma Xi, The Scientific Society (President, 2025 – 2026; President-elect, 2024 – 2025; Executive Committee, 2022 – Present)
- 2015 - Society for the Study of Reproduction (SSR)
- 2015 - American Association for the Advancement of Science (AAAS)
- 2015 - Iowa State University, CALS Curtiss League
- 2013 Beta Beta Beta Biological Honors Society
- 2013 Cardinal Key Honor Society
- 2011 Alpha Zeta Honor Fraternity

Editorial and Professional Appointments

Scientific Reports – Editorial Board Member

International Journal of Molecular Sciences – Guest Editor, Special Issue: “Recent Progress in Molecular Mechanisms of Sperm Metabolism and Development”

National Association of Animal Breeders – Scientific Advisor (2023 – Present); Technical Conference Planning Committee (2023 – Present)

Journal Peer Reviewer

Animal Reproduction Science

Animals

Biology of Reproduction

Cell and Tissue Research

Computer Methods in Biomechanics and Biomedical Engineering – Imaging and Visualization

Frontiers in Animal Science

Frontiers in Veterinary Science

Future Science

International Journal of Nanomedicine

Journal of Animal Science

Journal of Assisted Reproduction and Genetics

Journal of Dairy Science

Journal of the Royal Society Interface

Reproduction, Fertility and Development

Scientific Reports

Theriogenology

K. Outreach and Media:

Popular Media & In The News (*Since 2021*)

13. The Swine Report, “*Capturing Relative Phenotypes to Help Us Understand Boar Fertility*”
<https://www.youtube.com/watch?v=aiQzUPGezuQ>

12. Farms.com, “*Addressing Heat Stress in Boars.*”
<https://www.farms.com/videos/livestock/addressing-heat-stress-in-boars-dr-karl-kerns-172414.aspx>

11. Swine It, “*The Boar – The Forgotten Animal in the Swine Industry.*”
<https://www.youtube.com/watch?v=4iyNhp9j398>

10. Iowa PBS Education, “*Studying Genetics for Increased Food Production.*”
<https://www.youtube.com/watch?v=4zSu9hWSShA>

9. Iowa State University, College of Agriculture and Life Sciences, “*Latest cell sorter technology at Iowa State ‘opens new doors’ for research.*” <https://www.cals.iastate.edu/news/2023/latest->

cell-sorter-technology-iowa-state-opens-new-doors-research?fbclid=IwAR2KOAEnG3U3RRKd5obThrQ4ZAYIFZ3F-B3Xwxn5QyPkabr3W8g9TxBr0XA

8. Farm Journal's Pork, "*New Technology Makes Waves in Iowa State Animal Science Lab.*" <https://www.porkbusiness.com/news/education/new-technology-makes-waves-iowa-state-animal-science-lab>
7. Iowa State University, News Service, "*Virtual dissection fleshes out instruction in animal science anatomy lab.*" <https://www.news.iastate.edu/news/2024/02/26/virtualdissection>. February 26, 2024.
6. College of Agriculture and Life Sciences. AI tutor being developed to help Iowa State students find success. <https://www.cals.iastate.edu/news/2024/ai-tutor-being-developed-help-iowa-state-students-find-success>. 2024.
5. Ames Tribune. A master's degree, minor and tutor: What Iowa State University is doing with AI. <https://www.amestrib.com/story/news/local/2024/09/18/how-iowa-state-university-is-incorporating-ai-into-its-courses/75013505007/?gnt-cfr=1&gca-cat=p&gca-uir=true&gca-epi=z115541e002000v115541b0055xxd005565&gca-ft=172&gca-ds=sophi>. September 18, 2024.
4. Iowa State Daily. Iowa State lab researching livestock to uncover how biological factors impact human fertility. <https://iowastatedaily.com/316983/news/iowa-state-lab-researching-livestock-to-uncover-how-biological-factors-impact-human-fertility/>. April 13, 2025.
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