

## Derek W. Bailey

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### EDUCATION

B.S.	Colorado State University	Animal Science	1980
M.S.	Colorado State University	Animal Science	1985
Ph.D.	Colorado State University	Range Science	1988

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### PROFESSIONAL EXPERIENCE

2010-present	Professor <i>(currently 60% Research, 40% Teaching)</i>	<b>New Mexico State University</b>	Las Cruces, NM
2005–2010	Associate Professor <i>(45% Research, 40% Teaching, 15% Administration)</i>	<b>New Mexico State University</b>	Las Cruces, NM
2005-2017	CDRRC Director <i>(Director of Chihuahuan Desert Rangeland Research Center, CDRRC, aka NMSU College Ranch)</i>	<b>New Mexico State University</b>	Las Cruces, NM
2002-2004	Associate Professor <i>(100% Research)</i>	<b>Montana State University – Bozeman</b>	Havre, MT
1996-2002	Assistant Professor <i>(100% Research)</i>	<b>Montana State University – Bozeman</b>	Havre, MT
1995-1996	Extension Agent	<b>University of Arizona</b>	Globe, AZ
1994-1995	Scientist-Ecologist	<b>USDA-ARS</b>	Woodward, OK
1988-1993	Consultant	<b>Western Range Service</b>	Elko, NV

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### COURSES TAUGHT

- ❖ **RGSC 452 Vegetation Measurements for Rangeland Assessment.** Undergraduate vegetation monitoring course. Focus on cover, frequency, density, production and utilization. Sampling theory and analysis. (4 credits)
  - ❖ **ANSC / RGSC 458 Livestock Behavior, Welfare and Handling.** Undergraduate course developed by Bailey during Spring 2009. Principles of animal behavior and evaluation of management systems on animal welfare in confined and rangeland livestock operations. Low-stress livestock handling techniques. Design of livestock handling systems. (3 credits)
  - ❖ **RGSC 460 Advanced Rangeland Management.** Capstone undergraduate course in the NMSU Range Science program. Rangeland management planning; use of vegetation monitoring in decision making; stocking rate calculations; grazing systems; rangeland administration; economic analyses for rangeland improvements. (4 credits)
  - ❖ **RGSC 509 Approaches to Rangeland Research.** Graduate course. Techniques and methods of conducting rangeland and ecological research. Experimental design and statistical analyses. Proposal development. (3 credits)
  - ❖ **RGSC 515 Range Graduate Seminar** (1 credit)
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## AWARDS

- ❖ Fulbright Senior Scholarship (2017), Australian-American Fulbright Commission
- ❖ Mobley Family Endowed Distinguished Research Award (2019), New Mexico State University

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## INTERNATIONAL ACTIVITIES

- ❖ **China.** Invited Academic Exchange in 2009 with Qinghai University and Invited Speaker at the 6<sup>th</sup> International Yak Conference in 2018. Planned collaborative research with the Academy of Animal Science and Veterinary Medicine, Qinghai University; Xining, China
- ❖ **Jordan.** Co-PI (Range Scientist) with the NMSU Jordan Project. Visited Jordan 7 times during 2007 to 2010 to develop and evaluate rangeland restoration research projects and present educational workshops to local communities. Mentored Boralug Fellow from Jordan during 2017-2018.
- ❖ **Australia.** Invited 1.5 month trip to Australia in 2013. Awarded McMaster's Visiting Scientist Fellowship from CSIRO in 2008 which funded a 2-month trip to Australia. Invited speaker at scientific symposiums in 2011 and 2013. Adjunct faculty at Central Queensland University with numerous joint research projects, collaboration with University of New England, CSIRO and Primary Industries scientists.
- ❖ **Fulbright Senior Scholarship to Australia.** Award to conduct research in Australia for 4 months during 2017. Host institution was Central Queensland University. Research focus: Use of GPS tracking and sensor technology to monitor livestock welfare on rangeland.

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## RESEARCH EMPHASIS

Livestock grazing management; animal tracking and monitoring; livestock welfare and behavior, use of tracking and sensors to remotely monitor livestock health and well-being, rangeland livestock production; riparian area management; livestock-wildlife interactions; low-stress stockmanship.

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## FUNDING TO SUPPORT RESEARCH

**\$1,825,023 total**

*last 4 years presented*

- ❖ Meat and Livestock Australia, **\$59,838** (2020 to 2022). Spatially Resilient Grazing Systems: Developing objective measures of landscape utilisation and exploring opportunities to optimise production & sustainability in small ruminants in central Queensland rangelands. Bailey (co-PI).
- ❖ Harold James Family Trust, **\$230,000** (2017 to 2021). Evaluation of technologies to monitor cattle health and well-being. Bailey (PI)
- ❖ USDA Western SARE. **\$271,215** (2015 to 2019). Implementation of genetic selection for grazing distribution to make cattle grazing in the western US more sustainable. Bailey (PI) Collaborative effort with Colorado State University, University of California, Davis and University of Arizona
- ❖ USDA Foreign Agriculture Service. Borlaug Fellow Mentor. **\$39,898** (2017-2018). Bailey (PI)

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**PUBLICATIONS**

Refereed Book Chapters (n = 3)

- ❖ Polley, H. W., D.W. Bailey, R.S. Nowak, and M. Stafford-Smith. 2017. Ecological consequences of climate change on rangelands. In: D.D. Briske [ED.]. Rangeland systems: processes: management, and challenges. Cham Switzerland: Springer Open. p. 229-260.
- ❖ Bailey, D.W. Grazing and animal distribution. 2016. In: J.J. Villalba and X Manteca [EDS.]. Animal welfare in extensive systems. Sheffield, UK: 5M Publishing. p. 53-77.
- ❖ Bailey, D.W. and F.D. Provenza. 2008. Mechanisms determining large-herbivore distribution. In: H. H. T. Prins and F. van Langevelde [EDS.]. Resource ecology: spatial and temporal dynamics of foraging. Dordrecht, Netherlands: Springer. p. 7-28.

Refereed Scientific Journal Publications (n = 70) *Last 5 years*

- ❖ Bailey, D. W., M. G. Trotter, C. Tobin, and M. G. Thomas. 2021. Opportunities to apply precision livestock management on rangelands. *Frontiers in Sustainable Food Systems* 5:611915.
- ❖ Gurule, S. C., C. T. Tobin, D. W. Bailey, and J. A. H. Gifford. 2021. Evaluation of the tri-axial accelerometer to identify and predict parturition-related activities of Debouillet ewes in an intensive setting. *Applied Animal Behaviour Science* 237:105296.
- ❖ Tobin, C., D. W. Bailey and M. G. Trotter. 2021. Tracking and sensor based detection of livestock water system failure: A case study simulation. *Rangeland Ecology & Management* 77:9-16.
- ❖ Fogarty, E. S., D. L. Swain, G. M. Cronin, L. E. Moraes, D. W. Bailey, and M. Trotter. 2021. Developing a simulated online model that integrates GNSS, accelerometer and weather data to detect parturition events in grazing sheep: A machine learning approach. *Animals* 11:303.
- ❖ Raynor, E., S. Gersie, M. Stephenson, P. Clark, S. Spiegel, R. Boughton, D. Bailey, A. Cibils, B. Smith, J. Derner. R. Neilson and D. Augustine. 2021. Cattle grazing distribution patterns related to topography across diverse rangeland ecosystems of North America. *Rangeland Ecology & Management* 75:91-103.
- ❖ Tobin, C., D. W. Bailey, M. G. Trotter, and L. O'Connor. 2020. Sensor based disease detection: A case study using accelerometers to recognize symptoms of Bovine Ephemeral Fever. *Computers and Electronics in Agriculture* 175:105605.
- ❖ Ojima, D. S., R. Aicher, S. R. Archer, D. W. Bailey, S. M. Casby-Horton, N. Cavallaro, J. J. Reyes, J. A. Tanaka, and R. A. Washington-Allen. 2020. A climate change indicator framework for rangelands and pastures of the USA. *Climatic Change*: 163:1733–1750.
- ❖ Di Stéfano, S., J.W. Karl, D.W. Bailey, and S. Hale. 2020. Evaluation of the automated reference toolset as a method to select reference plots for oil and gas reclamation on Colorado Plateau rangelands. *Journal of Environmental Management* 265:110578.
- ❖ Fogarty, E.S., D.L. Swain, G.M. Cronin, L.E. Moraes, D.W. Bailey and M.G. Trotter. 2020. Potential for autonomous detection of lambing using GNSS technology. *Animal Production Science* 60:1217-1226.
- ❖ Kimiti, D.W., A.C. Ganguli, J.E. Herrick, and D.W. Bailey. 2020. Evaluation of restoration success to inform future restoration efforts in *Acacia reficiens* invaded rangelands in northern Kenya. *Ecological Restoration* 38:105-113.
- ❖ Kimiti, D.W., A.C. Ganguli, J.E. Herrick, J.W. Karl, and D.W. Bailey. 2020. A decision support system for incorporating land potential information in the evaluation of restoration outcomes. *Ecological Restoration* 38:94-104.

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- ❖ Mayagoitia, P., D.W. Bailey, and R.E. Estell. 2020. Phenological changes in the nutritive value of honey mesquite leaves, pods, and flowers in the Chihuahuan Desert. *Agrosystems, Geosciences & Environment* 3:e20026.
- ❖ Millward, M.F., D.W. Bailey, A.F. Cibils, and J.L. Holechek. 2020. A GPS-based evaluation of factors commonly used to adjust cattle stocking rates on both extensive and mountainous rangelands. *Rangelands* 42(3) doi: 10.1016/j.rala.2019.07.00
- ❖ Pierce, C. F., S. E. Speidel, S. J. Coleman, R. M. Enns, D. W. Bailey, J. F. Medrano, A. Cánovas, P. J. Meiman, L. D. Howery, W. F. Mandeville, and M. G. Thomas. 2020. Genome-wide association studies of beef cow terrain-use traits using Bayesian multiple-SNP regression. *Livestock Science* 232:103900.
- ❖ Bailey, D.W., J.C. Mosley, R.E. Estell, A.F. Cibils, M. Horney, J.R. Hendrickson, J.W. Walker, K.L. Launchbaugh and E.A. Burritt. 2019. Synthesis Paper: Targeted livestock grazing: A prescription for healthy rangelands. *Rangeland Ecology & Management* 72: 865-877.
- ❖ Bailey, D. W., M. G. Trotter, C. W. Knight, M. G. Thomas. 2018. Use of GPS tracking collars and accelerometers for rangeland livestock production research. *Transactional Animal Science* 2:81-88.
- ❖ Knight, C. W., D. W. Bailey, and D. Faulkner. 2018. Low-cost global positioning system tracking collar for use on cattle. *Rangeland Ecology & Management* 71:506-508.
- ❖ Altangerel, N., J. W. Walker, P. M. González, D. W. Bailey, R. E. Estell, and M. O. Scully. 2017. Comparison of near infrared reflectance spectroscopy and raman spectroscopy for predicting botanical composition of cattle diets. *Rangeland Ecology & Management* 70:781-786.
- ❖ Smythe, B.G., S. Urias, M.E. Wise, E.J. Scholljegerdes, A.F. Summers, and D.W. Bailey. 2017. Comparing visual and digital counting methods to estimate horn fly (*Diptera: muscidae*) populations on cattle. *Journal of Medical Entomology*. doi: 10.1093/jme/tjw248
- ❖ Stephenson, M. B., D. W. Bailey, R. A. Bruegger, and L. D. Howery. 2017. Factors affecting the efficacy of low-stress herding and supplement placement to target cattle grazing locations. *Rangeland Ecology & Management* 70:202-209.
- ❖ Stephenson, M., and D. W. Bailey. 2017. Do movement patterns of GPS-tracked cattle on extensive rangelands suggest independence among individuals? *Agriculture* 7:58.
- ❖ Bailey, D. W., M. G. Thomas, T. N. Holt, M. B. Stephenson, R. M. Enns, and S. E. Speidel. 2016. Relationship of pulmonary arterial pressure and terrain use of Angus cows grazing high-altitude foothill rangelands. *Livestock Science* 190:76-80.
- ❖ Bruegger, R.A., L.A. Varelas, L.D. Howery, L.A. Torell, M.B. Stephenson, and D.W. Bailey. 2016. Targeted grazing in southern Arizona: using cattle to reduce fine fuel loads. *Rangeland Ecology & Management* 69:43-51
- ❖ Pittarello, M, M. Probo, M. Lonati, D.W. Bailey, and G. Lombardi. 2016. Effects of traditional salt placement and strategically placed mineral mix supplements on cattle distribution in the Western Italian Alps. *Grass and Forage Science* 71:529-539.
- ❖ Stephenson, M.B., D.W. Bailey, and D. Jensen. 2016. Association patterns of visually-observed cattle on Montana, USA foothill rangelands. *Applied Animal Behaviour Science* 178:7-15.
- ❖ Stephenson, M. B., D. W. Bailey, L. D. Howery, and L. Henderson. 2016. Efficacy of low-stress herding and low-moisture blocks to target cattle grazing locations on New Mexico rangelands. *Journal of Arid Environments* 130:84-93.

Other selected journal articles

- ❖ Bailey, D.W., S. Lunt, A. Lipka, M.G. Thomas, J.F. Medrano, A. Cánovas, G. Rincon, and M.B. Stephenson. 2015. Genetic influences on cattle grazing distribution: Association of genetic markers with terrain use in cattle. *Rangeland Ecology and Management* 68:142-149.
- ❖ Probo, M., A. Massolo, M. Lonati, D.W. Bailey, A. Gorlier, L. Maurino, and G. Lombardi. 2013. Use of mineral mix supplements to modify the grazing patterns by cattle for the restoration of sub-alpine and alpine shrub-encroached grasslands. *Rangeland Journal* 35:85-93.
- ❖ Russell, M.L., D.W. Bailey, M.G. Thomas, and B.K. Witmore. 2012. Grazing distribution and diet quality of Angus, Brangus and Brahman Cows in the Chihuahuan Desert. *Rangeland Ecology and Management* 65:371-381.
- ❖ Bailey, D.W. and J.R. Brown. 2011. Rotational grazing systems and livestock grazing behavior in shrub-dominated semi-arid and arid rangelands. *Rangeland Ecology and Management* 64:1-9.
- ❖ Bailey, D.W., M.G. Thomas, J.W. Walker, B.K. Witmore, and D. Tolleson. 2010. Effect of previous experience on grazing patterns and diet selection of Brangus cows in the Chihuahuan Desert. *Rangeland Ecology and Management* 63:223-232.
- ❖ Bailey, D.W., H.C. VanWagoner, R. Weinmeister, and D. Jenson. 2008. Evaluation of low-stress herding and supplement placement for managing cattle grazing in riparian and upland areas. *Rangeland Ecology and Management* 61:26-37.
- ❖ Bailey, D.W., H.C. VanWagoner, R. Weinmeister, and D. Jenson. 2008. Comparison of low-moisture blocks and salt for manipulating grazing patterns of beef cows. *Journal of Animal Science* 86:1271-1277.
- ❖ Bailey, D.W. 2005. Invited synthesis paper: Identification and creation of optimal habitat conditions for livestock. *Rangeland Ecology and Management* 58:109-118.
- ❖ Haley, D.B., D.W. Bailey, and J.M. Stookey. 2005. The effects of weaning calves in two stages on their behavior and growth rate. *Journal of Animal Science* 83:2205-2214.
- ❖ Bailey, D.W. 2004. Management strategies for optimal grazing distribution and use of arid rangelands. *Journal of Animal Science* 82(E. Suppl.):E147-E153.
- ❖ Bailey, D.W., D.D. Kress, D.C. Anderson, D.L. Boss, and E.T. Miller. 2001. Relationship between terrain use and performance of beef cows grazing foothill rangeland. *Journal of Animal Science* 79:1883-1891.
- ❖ Bailey, D.W., G.R. Welling, and E.T. Miller. 2001. Cattle use of foothills rangeland near dehydrated molasses supplement. *Journal of Range Management* 54: 338-347.
- ❖ Bailey, D.W., J.E. Gross, E.A. Laca, L.R. Rittenhouse, M.B. Coughenour, D.M. Swift, and P.L. Sims. 1996. Mechanisms that result in large herbivore grazing distribution patterns. *Journal of Range Management* 49:386-400.
- ❖ Senft, R.L., M.B. Coughenour, D.W. Bailey, L.R. Rittenhouse, O.E. Sala, and D.M. Swift. 1987. Large herbivore foraging and ecological hierarchies. *BioScience* 37:789-799.

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**Selected Extension Publications (n=21)**

- ❖ Bailey, D. W., Tobin, C. 2020. Application of precision livestock management on ranches in New Mexico and the western US. NMSU Cooperative Extension. <https://aces.nmsu.edu/nmbeef/documents/2020-nmsu-beef-and-livestock-research-update-proceedings-ads-comp-v2.pdf>

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- ❖ Gurule, S., Tobin, C., Bailey, D. W., Hernandez Gifford, J. 2020. Identifying and predicting parturition of sheep using a tri-axial accelerometer. CES Annual Data Report., Date Submitted: September 15, 2020, Date Accepted: October 1, 2020, Item applies to Promotion and Tenure criteria: Extension, Scholarship and Creative Activity, Item applies to Boyer scholarship(s): Discovery, Engagement.
- ❖ Cram, D. S., Ward, M. A., Ashcroft, N. K., Bailey, D. W. 2018. Strategies for livestock management in riparian areas in New Mexico (Revision) (ed.). Las Cruces, NM: New Mexico Cooperative Extension. [aces.nmsu.edu/pubs/\\_b/B119.pdf](https://aces.nmsu.edu/pubs/_b/B119.pdf)
- ❖ Howery, L. D., Bailey, D. W. 2018. Nature and nurture's influence on cattle distribution (ed.). Tucson, AZ: The University of Arizona Cooperative Extension. <https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1760-2018.pdf>
- ❖ Bailey, D. W., Trotter, M., Knight, C., Thomas, M. 2017. Advancements in rangeland livestock management: new technologies meet the old frontier of extensive grazing systems (pp. 6). Hamilton: 1st Asian-Australasian Conference on Precision Agriculture and Livestock Farming. <https://zenodo.org/communities/pa17>
- ❖ Bailey, D. W., Stephenson, M. (2013). Integrating stockmanship into rangeland management. Stockmanship Journal, 2(1), 1-12.
- ❖ Knapp, C., Fernandez-Gimenez, M., Bruegger, R., Howery, L., Torell, L. A., Bailey, D. W. 2011 Perceptions of targeted grazing in the desert southwest. Corona Field Day, NMSU Corona Range and Livestock Research Center, Corona, NM
- ❖ George, M., D. Bailey, M. Borman, D. Ganskopp, G. Surber, and N. Harris. 2007. Factors and Practices that Influence Livestock Distribution. University of California ANR Rangeland Management Series Pub. 8217, 20 p. Available at <http://anrcatalog.ucdavis.edu/pdf/8217.pdf>
- ❖ Wyman, S., D. W. Bailey, M. Borman, S. Cote, J. Eisner, B. Leinard, S. Leonard, F. Reed, S. Swanson, L. Van Riper, T. Westfall, R. Wiley, and A. Winward. 2006. Riparian area management: Grazing management processes and strategies for riparian-wetland areas. Technical Reference TR 1737-20. BLM/ST/ST-06/002+1737. U.S. Department of Interior, Bureau of Land Management, National Science and Technology Center, Denver, CO. 105 p.
- ❖ Sprinkle, J.W and Bailey, D.W. 2006. How many animals can I graze on my pasture? Determining carrying capacity on small land tracts. University of Arizona Cooperative Extension Publication AZ 1352. Available at: <http://cals.arizona.edu/pubs/animal/az1352.pdf>.
- ❖ Bailey, D.W., H. VanWagoner, and R. Weinmeister. 2005. Selecting cattle to improve grazing distribution patterns, rangeland health and water quality. Agricultural Innovations Fact Sheet, USDA Sustainable Agriculture Research & Education. <http://www.sare.org/publications/factsheet/0505.htm>
- ❖ Bailey, D.W., H.C. VanWagoner, D.J. Garrick, M.G. Thomas, and R. Weinmeister. 2005. Sire and dam effects on distribution patterns of cows grazing mountainous rangelands. NMSU Research Briefs and Cattle Grower Short Course, p. 94.
- ❖ Haley, D.B, J.M Stookey, and D.W. Bailey. 2003. More on two-step weaning. Beef, Oct. 2003 pg. 54-56.

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### Thesis

- ❖ Bailey, D.W. 1988. Characteristics of spatial memory and foraging behavior in cattle. Ph.D. Diss. Colorado State Univ., Fort Collins.
- ❖ Bailey, D.W. 1985. Genetic parameters of reproductive traits in beef cows. M.S. Thesis, Colorado State Univ., Fort Collins.