

## **APPENDIX D**

**SAES-422**

### **Accomplishments Report**

**Project/Activity Number:** NCERA - 225

**Project/Activity Title:** Implementation and Strategies for National Beef Cattle Genetic Evaluation

**Period Covered:** November 2017 – December 2018

**Date of This Report:** March 15, 2019

**Annual Meeting Date(s):** December 4-6, 2018

### **NCERA-225**

#### **Implementation and Strategies for National Beef Cattle Genetic Evaluation 2018 Meeting Minutes**

**December 4-6, 2018**

**KCI Expo Center, Kansas City, Missouri**

**Chair:** Dr. Larry Kuehn

**Secretary:** Dr. Robert Weaber

The meeting was called to order by Chairman Kuehn at approximately 6:30 PM on Tuesday, December 4, 2018.

Chairman Kuehn briefly reviewed the programmatic schedule for the joint NCERA-225/BIF Genetic Prediction Workshop.

Roll was taken of the attendees present at the business meeting. Those attending were: Speidel, Golden, Hyde, Bradford, Weaber, Decker, Thallman, Kuehn, Spangler, Snelling, Tempelman, Saatchi, Bennett, Miller, Cassady (AA), Gondro, Lourenco, Kachman, Garcia, Bullock, Devani, Atkins, and Rolf.

#### **Old Business:**

No old business was presented to the meeting floor.

#### **New business:**

Weaber and Thallman briefly reviewed the agenda (attached pdf) and objectives of the NCERA-225/Beef Improvement Federation Genetic Prediction Workshop. Dr. Thallman commented, "The primary purpose of this workshop is to share experiences and ideas regarding the refinements of genomic evaluation and selection indices in a more technical forum than is appropriate for the Annual Beef Improvement Federation Convention. Much progress has been made in the last few years, but there is much more to be learned and done."

Thallman and Weaber encouraged NCERA-225 members to provide questions during the planned discussion time to ensure that ideas were adequately reviewed and explored. Weaber provided a brief overview of the agenda frame work and a number of house-keeping items related to meals and AV at the venue. Full GPW meeting coverage will be provided at <https://beefimprovement.org/library-2/genetic-prediction-workshop>. Coverage includes video/audio recordings of presentations and pdf copies of the presenter slides. Proceedings will also be made available via the BIF GPW web page.

The group then took up discussion of the 2019 NCERA-225 meeting. Dr. Heather Bradford, Virginia Tech, offered to host the event in 2019, date TBD, in Blacksburg, VA.

2019 officers were elected by acclamation. Dr. Heather Bradford was elected as chairperson of the committee and Dr. Gota Morota, Virginia Tech (formerly University of Nebraska-Lincoln) will serve as secretary.

Dr. Darrh Bullock moved for adjournment at 7:15 PM

Respectfully submitted,

A handwritten signature in black ink that reads "Robert L. Weaber". The signature is written in a cursive style with a long horizontal flourish at the end.

Dr. Robert L. Weaber,  
Professor,  
Kansas State University

## Accomplishments:

During the 2017-2018 year the committee and its members were very active working individually and collectively towards our common objectives:

1. Provide a venue for the discussion and exchange of information for the many disconnected and diverse research activities--biological, genomic, statistical, computational, and economical--that support National Cattle Evaluation (NCE).
  - a. During the Current reporting period members of the committee (Thallman, Weaber, Bullock, Spangler, Kuehn) organized and held the joint NCERA-225/Beef Improvement Federation Genetic Prediction Workshop in Kansas City, bringing together the research, extension and trade organization thought leaders to evaluation and explore the future of beef cattle genetic evaluation. The results of the conference will plot the trajectory of genetic/genomic evaluation research and extension for the next 5 years. The GPW was attended by approximately 80 people and featured 1.5 days of in-depth programming and discussion on current challenges and opportunities in genetic evaluation systems. Full conference proceedings and recordings of the event are available at : <https://beefimprovement.org/library-2/genetic-prediction-workshop> . A full agenda is attached as PDF.
2. Develop through this exchange new tools for delivery and use of beef cattle genetic research, including genomic information, to beef breed associations and beef cattle producers.
  - a. The 2018 NCERA-225/BIF GPW provided in depth discussion on new avenues for research and development for new traits and tools for selection.
3. Update the beef cattle industry on current developments in beef breeding and genetics research including changes in genomic tools and analyses.
  - a. Committee members (Bullock, Weaber and Spangler) led the 2018 Brown Bagger Series of seminars to provide education content to ~100 county, district, regional and state extension educator and breed association technical staff on new and emerging issues/developments in beef cattle genetic evaluation. The series featured committee members: Golden, Speidel, Rolf, Kuehn, Bullock and Spangler. The series recordings and agenda is available here: <http://www.nbcec.org/professionals/brownbag.html>
  - b. Committee members Spangler, Weaber, Rolf, Bullock, Decker (and Van Eenennaam) collaborate to maintain and expand the availability of beef genetics extension materials available online at [www.eBEEF.org](http://www.eBEEF.org) .
  - c. A wide range of committee members interface beef producers and various organization involved in selection and genetic improvement via presentations, symposia or trade publications. A list of those are included below.
4. Collaborate with appropriate groups (eg. BIF, and USDA/NIFA funded Integrated Projects) on research and outreach.
  - a. The Genetic Prediction Workshop was a collaboration between BIF and NCERA-225 group.

- b. A USDA funded project on beef cattle genetics decision was engaged in the GPW sessions (Spangler PI)
- c. A number of committee members are routinely engaged in genetic evaluation system development and deployment for various breed associations: Spangler, Bullock, Speidel, Enns, Hyde, Golden, Moser, Miller, Bedwell, Weaber, Kuehn, Kachman, Thallman. This engagement leads to the direct incorporation of novel research and development into national cattle evaluation systems.
- d. Weaber and Spangler collaborate with the King Ranch Institute for Ranch Management to provide an annual lectureship for producers on utilization of advanced beef cattle selection tools.

## **Impacts:**

### ***Research***

Committee members are actively engaged in the development and implementation of state-of-the-art national cattle evaluation systems across the US and Canada. These researchers contribute extensively to the basic and applied research needed to sustain and improve genetic evaluation systems used by beef cattle producers domestically and around the world. A comprehensive list of research publications attached demonstrating the breadth and depth of work undertaken by members of this committee. Note many publications feature multiple committee members illustrating the collaborative nature of this group.

The Genetic Prediction Workshop provides a key face-to-face meeting of the thought leaders in beef cattle genetic improvement every five years. The impact of this meeting is realized through the continued collaboration on research and extension activities highlighted as needs for the industry. No where else does the in-depth discussion and debate occur on these important issues with all the key players included in the dialog. Dr. Thallman summarizes the expected impacts well in his preface comments in the current proceedings document:

..."the 11th Genetic Prediction Workshop was organized and cosponsored by the Beef Improvement Federation and Regional Technical Committee NCERA-225 comprised of scientists at land grant Universities, the USDA, breed associations and other organizations that support and conduct beef cattle genetic evaluations in the U.S. and Canada.

The primary purpose of this workshop is to share experiences and ideas regarding the refinements of genomic evaluation and selection indices in a more technical forum than is appropriate for the Annual Beef Improvement Federation Convention. Much progress has been made in the last few years, but there is much more to be learned and done."

### ***Extension Outreach:***

Committee members Spangler, Weaber, Rolf, Bullock, Decker collaborate to maintain and expand the availability of beef genetics extension materials available online at [www.eBEEF.org](http://www.eBEEF.org). The website provided a one-stop-shop of contemporary beef cattle genetics education materials.

Committee members (Weaber, Bullock and Spangler) work to expand the knowledge base among extension educators through their online 'Brown Bagger' series held each October. This training tool has a long and successful track record of bringing innovative and timely programming on selection tools, research discoveries and perspectives to extension educators and breed association technical staff.

# 2018 NCERA-225 Implementation and Strategies for National Beef Cattle Genetic Evaluation

## Publications and Presentations

### Peer Reviewed Manuscripts:

1. Abdoli, R., S.Z. Mirhoseini, N. Ghavi Hossein-Zadeh, P. Zamani, C. Gondro (2018). Genome-wide association study to identify genomic regions affecting prolificacy in Lori-Bakhtiari sheep. *Animal Genetics* 49:488-491.
2. Aherin, D.G., J.M. Bormann, J.L. Heier Stamm, M.D. MacNeil, and R.L. Weaber. 2018. Decision Making Tools: Stochastic simulation model accounting for the impacts of biological variation on success of bovine embryo transfer programs. *Translation Animal Science*. 2:451-462. doi: 10.1093/tas/txy087.
3. Ahlberg CM, Allwardt K, Broocks A, Bruno K, McPhillips L, Taylor A, Krehbiel CR, Calvo-Lorenzo MS, Richards CJ, Place SE, DeSilva U, VanOverbeke DL, Mateescu RG, Kuehn LA, Weaber RL, Bormann JM, Rolf MM. Environmental effects on water intake and water intake prediction in growing beef cattle. *J Anim Sci*. 2018 Sep 29;96(10):4368-4384. doi: 10.1093/jas/sky267.
4. Ahlberg CM, Allwardt K, Broocks A, Bruno K, McPhillips L, Taylor A, Krehbiel CR, Calvo-Lorenzo M, Richards CJ, Place SE, DeSilva U, VanOverbeke DL, Mateescu RG, Kuehn LA, Weaber RL, Bormann JM, Rolf MM. Test duration for water intake, ADG, and DMI in beef cattle. *J Anim Sci*. 2018 Jul 28;96(8):3043-3054. doi: 10.1093/jas/sky209.
5. Ahlberg, C.M., K. Allwardt, A. Broocks, K. Bruno, L. McPhillips, A. Taylor, C.R. Krehbiel, M. Calvo-Lorenzo, C.J. Richards, S.E. Place, U. DeSilva, D.L. VanOverbeke, R.G. Mateescu, L.A. Kuehn, R. Weaber, J. Bormann, M.M. Rolf. 2018. Environmental effects on water intake and water intake prediction in growing beef cattle. *J. Anim. Sci*. 96:4368-4384. doi: 10.1093/jas/sky267
6. Ahlberg, C.M., K. Allwardt, A. Broocks, K. Bruno, L. McPhillips, A. Taylor, C.R. Krehbiel, M. Calvo-Lorenzo, C.J. Richards, S.E. Place, U. DeSilva, D.L. Van Overbeke, R.G. Mateescu, L.A. Kuehn, R.L. Weaber, J.M. Bormann, and M.M. Rolf. 2018. Test duration for water intake, ADG, and DMI in beef cattle. *J. Anim. Sci*. 96:3043-3054. doi:10.1093/jas/sky209.
7. Bhuiyan, M.S.A., D. Lim, M. Park, S. Lee, Y. Kim, C. Gondro, B. Park and S. Lee (2018). Functional Partitioning of Genomic Variance and Genome-Wide Association Study for Carcass Traits in Korean Hanwoo Cattle Using Imputed Sequence Level SNP Data. *Frontiers in Genetics* 9:217.
8. Boldt, R.J., S.E. Speidel, M.G. Thomas, and R.M. Enns. 2018. Genetic parameters for fertility and production traits in Red Angus cattle. *J. Anim. Sci*. 96:4100-4111. doi:10.1093/jas/sky294.

9. Bormann, J.M. and M.M. Rolf. 2018. The use of current events to enhance student learning in agricultural genetics. *NACTA Journal*. 62:89-94.
10. Bourgon, S.L., M. Diel de Amorim, T. Chenier, M. Sargolzaei, S.P. Miller, J.E. Martell and Y.R. Montanholi. 2018. Relationships of nutritional plane and feed efficiency with sexual development and fertility related measures in young beef bulls. *Anim. Reprod. Sci.* 198:99-111.
11. Bruinjé, T.C., P. Ponce-Barajas, A. Dourey, M.G. Colazo, T. Caldwell, Z. Wang, S.P. Miller and D.J. Ambrose. 2018. Morphology, membrane integrity and mitochondrial function in sperm of crossbred beef bulls selected for residual feed intake. *Can. J. Anim. Sci.* (accepted 2 October 2018) (<https://doi.org/10.1139/CJAS-2018-0103>)
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17. Howard\*, J.T., T. A. Rathje, C. E. Bruns, D. F Wilson-Wells, S. D. Kachman, and M. L. Spangler. 2018. The impact of truncating data on predictive ability for single-step genomic best linear unbiased prediction. *J. Anim. Breed. and Genetics* 135: 251-262.
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31. Paz, Henry A., Kristin E. Hales, James E. Wells, Larry A. Kuehn, Harvey C. Freetly, Elaine D. Berry, Michael D. Flythe, Matthew L. Spangler, and Samodha C. Fernando. 2018. Rumen bacterial community structure impacts feed efficiency in beef cattle. *J. Anim. Sci.* 96:1045-105.



32. S.E. Speidel, B.A. Buckley, R.J. Boldt, R.M. Enns, J. Lee, M.L. Spangler, and M.G. Thomas. 2018. Genome wide association of heifer pregnancy and stayability in Red Angus cattle. *J. Anim. Sci.* 96:846-853. doi:10.1093/jas/sky041/4869971.
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## Abstracts:

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2. Cantrell, B., N. Jebbett, R. C. Switzer III, E. Delay, S. Zinn, S. Aborn, J. O'Neil, R. Funston, R. Weaber and S.D. McKay. 2018. Prevalence of DNA Methylation in the Bovine Brain Methylome. University of Vermont Student Research Conference, Burlington, Vermont
3. Cantrell, B., N. Jebbett, R. C. Switzer III, E. Delay, S. Zinn, S. Aborn, J. O'Neil, R. Funston, R. Weaber and S.D. McKay. 2018. Facilitation of the Bovine Epigenome in the Limbic System: An Atlas of the Bovine Brain. Eighth Annual Neuroscience, Behavior and Health Research Forum, Burlington, VT
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  14. Pierce, C.F, D.W. Bailey, J. Medrano, A. Cánovas, S E. Speidel, S. Coleman, R.M. Enns, M.G. Thomas. 2018. Validation of Quantitative Trait Loci Associated with Grazing Distribution Traits in Beef Cattle Using Bayes C. *J. Anim. Sci.* 96(Suppl 3):105. <https://doi.org/10.1093/jas/sky404.232>.
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  16. Spangler, M.L. 2018. Genomic Selection: Historical perspective and development of methods in use today (invited). *J. Anim. Sci.* 96: Suppl 3.
  17. Spangler, M.L. 2018. Harlan Ritchie Symposium: Current trends in beef cattle genetic evaluation (invited). *J. Anim. Sci.* 96: Suppl. 2.
  18. Speidel, S.E., M. M. Culbertson, M. A. Sánchez-Castro, K. Sellins, T. E. Engle, M. G. Thomas and R. M. Enns. 2018. Factors influencing blood urea nitrogen concentration in Angus cattle. *J. Anim. Sci.* 96(Suppl 3):384. <https://doi.org/10.1093/jas/sky404.842>.
  19. Yu, Haipeng, Matthew L. Spangler, Ronald M. Lewis, and Gota Morota. 2018. An Assessment of Genomic Relatedness across Management Units. *J. Anim. Sci.* 96: Suppl. 2.

## Conference Papers:

1. Baller, J.L., S. D. Kachman, and M.L. Spangler. 2018. The impact of different clustering methods on the estimated accuracy of genomic predictors. Proc. 11th World Congress on Genetics Applied to Livestock Production.
2. Bernardes, P. A., H. A. Al-Mamun, M. Suarez, D. Lim, B. Park and C. Gondro (2018). Imputation accuracy of whole-genome sequence data in Hanwoo cattle. Proceedings of the 10th World Congress on Genetics Applied to Livestock Production.
3. Bhuiyan, M. S. A. D. Lim, C. Gondro, I. C. Choi, J. H. Lee and S. H. Lee (2018). Partitioning of Genomic Variance Captured by Imputed Sequence Level SNP Data for Carcass and Meat Quality Traits in Korean Hanwoo Cattle. Proceedings of the 10th World Congress on Genetics Applied to Livestock Production.
4. C.F. Pierce, D.W. Bailey, J.F. Medrano, A. Cánovas, S.E. Speidel, S.J. Coleman, R.M. Enns, and M.G. Thomas. 2018. Characteristics of grazing distribution traits in beef cattle for genotype-phenotypes associations. Proc. 11th World Congr. Genet. Appl. Livest. Prod. 11:246. February 15, 2018, Auckland, NZ.
5. de las Heras-Saldana, S., H. Kim, G. Gondro and K.Y. Chung (2018). Markers for Marbling development. Proceedings of the 10th World Congress on Genetics Applied to Livestock Production.
6. Duijvesteijn, N., S. Bolormaa, C. Gondro, S. Clark, M. Khansefid, N. Moghaddar, A.A. Swan, P. Stothard, H.D. Daetwyler, J.H.J. van der Werf and I.M. MacLeod (2018). Genome-wide association study of meat quality traits using whole-genome sequence data in a multi-breed sheep population. Proceedings of the 10th World Congress on Genetics Applied to Livestock Production.
7. Ekine-Dzivenu, C., E.C. Akanno, L. Chen, L. McKeown, B. Irving, L. Baker, M. Vinsky, S. Miller, Z. Wang, J. Crowley, M. Colazo, D. Ambrose, M. Juarez, H. Bruce, M.D. MacNeil, G. Plastow, J. Basarab, C. Li and C. Fitzsimmons. 2018. Improvement of cow feed efficiency using molecular breeding values for residual feed intake – The “Kinsella Breeding Project”. Proc. 11th World Congr. Genet. Appl. Livest. Prod., Auckland, New Zealand
8. Golden, B.L., M. L. Spangler, W. M. Snelling, D. J. Garrick. 2018. Current single-step national beef cattle evaluation models used by the American Hereford Association
9. Herrera, J. R. V., E.B. Flores, N. Duijvesteijn, C. Gondro and J. H.J. van der Werf (2018). Genome-wide association study for milk traits in Philippine dairy buffaloes. Proceedings of the 10th World Congress on Genetics Applied to Livestock Production.
10. Howard, J.T., S. D. Kachman, and M. L. Spangler. 2018. The impact of utilizing previous generations of genotyped animals in genomic selection. Proc. 11th World Congress on Genetics Applied to Livestock Production.
11. Id-Lahoucine, S., J. Casellas, P.A. Fonseca, F. Miglior, M. Sargolzaei, L. Brito, S. Miller, J. Chesnais, M. Lohuis, F. Schenkel, J.F. Medrano and A. Canovas. 2018. Genome scan for regions with transmission ratio distortion in cattle. Proc. 11th World Congr. Genet.

- Appl. Livest. Prod., Auckland, New Zealand Al-Mamun, H.A. S., Shahinfar, B. Park, S. Kim and C. Gondro (2018). Prediction of marbling score and carcass traits in Hanwoo Korean beef cattle using machine learning methods. Proceedings of the 10th World Congress on Genetics Applied to Livestock Production.
12. Lourenco, D.A.L., S. Tsuruta, B.O. Fragomeni, Y. Masuda, I. Aguilar, A. Legarra, S.P. Miller, D.W. Moser and I. Misztal. 2018. Single-step genomic BLUP for national beef cattle evaluation in US: from initial developments to final implementation. Proc. 11th World Congr. Genet. Appl. Livest. Prod., Auckland, New Zealand
  13. Miller, S.P., L. Wang, K.J. Retallick and D.W. Moser. 2018. Developments in the genetic evaluation of American Angus cattle. Proc. 11th World Congr. Genet. Appl. Livest. Prod., Auckland, New Zealand
  14. Pariacote, F.A., E.J. Pollak, and M. L. Spangler. 2018. Genetic Parameter Estimates between Maternal and Terminal Traits in Composite Beef Cattle Population. Proc. 11th World Congress on Genetics Applied to Livestock Production.
  15. Souza, G.M., S. de las Heras-Saldana, C. Gondro, A.L.J. Ferraz, G.L.D. Feijó and E.F Delgado (2018). Impact of weight recovery on transcriptome and meat phenotypes of adult Nellore cows. Proceedings of the 10th World Congress on Genetics Applied to Livestock Production.
  16. Spangler, M.L. 2018. Genetic Selection for Efficiency. In Proc. State of Beef Conference, North Platte, NE.
  17. Spangler, M.L. 2018. Use of genomics in bovine genetic selection and utilization of genomics in other ag sectors. American Association of Bovine Practitioners.
  18. Spangler, M.L., B.L. Golden, L.A. Kuehn, W.M. Snelling, R.M. Thallman, R.L. Weaber. 2018. Decision support using customizable indices across breeds. Proc. Beef Improv.
  19. Thomas, M.G., J.M. Neary, G.M. Krafusur, T.N. Holt, R.M. Enns, S.E. Speidel, F.B. Garry, A. Canovas, J.F. Medrano, R.D. Brown, and K.R. Stenmark. 2018. Pulmonary hypertension in beef cattle: a complicated threat to health and productivity in multiple beef industry segments. White Paper for Certified Angus Beef. <http://www.cabpartners.com/news/research.php>. Accepted 5/9/2018.
  20. Ventura, R.V., L.F. Brito, G. Vandervoort, M. Sargolzaei, A. Hess, M. McMorris, T. Caldwell, A. Canovas, K.G. Dodds, S. Clarke and S.P. Miller. 2018. The potential of genotyping pooled DNA to leverage commercial phenotypes for genetic improvement of beef cattle. Proc. 11th World Congr. Genet. Appl. Livest. Prod., Auckland, New Zealand
  21. Weaber, R. L. 2018. Genetic Evaluation and Use of Genomic Data in Beef Cattle. Am. Assoc. Bovine Practitioners Genetics Webinar Series. August 7, 2018.
  22. Weerasinghe, W.M.S.P, C. Gondro, A.M. Okeyo, J. Ojango, J. Rao, T. Dessie, F. D. Mujibi, J. E. O. Rege and J. P. Gibson (2018). Genetic diversity of the indigenous cattle of Kenya, Uganda, Ethiopia and Tanzania using high-density SNP data. Proceedings of the 10th World Congress on Genetics Applied to Livestock Production.
  23. Yu, Haipeng, Matthew L. Spangler, Ronald M. Lewis, and Gota Morota. 2018. Stronger measures of genomic connectedness enhance prediction accuracies across

management units. Proc. 11th World Congress on Genetics Applied to Livestock Production.

24. Zimmermann, M.J., L. A. Kuehn, M. L. Spangler, R. M. Thallman, W. M. Snelling, and R. M. Lewis. 2018. Modelling Growth from Weaning to Maturity in Beef Cattle Breeds. Proc. 11th World Congress on Genetics Applied to Livestock Production.

### **Technical Publications:**

1. Boldt, R.J., S.E. Speidel and R.M. Enns. 2018. Report to the Red Angus Association of America. Results of the development of a dry matter intake genetic prediction. 5-pages.
2. Culbertson, M.M., R.M. Enns and S.E. Speidel. 2018. Report to Leachman Cattle of Colorado. Results of development of a Multivariate PAP EPD. 6-pages.
3. Enns, R. M., S. E. Speidel. 2018. Report to ABS Global. Result of Pulmonary Arterial Pressure Tests on Progeny of ABS Global Sires. 6-pages.
4. Enns, R. M., S. E. Speidel. 2018. Report to Select Sires, Inc. Result of Pulmonary Arterial Pressure Tests on Progeny of Select Sires, Inc. Bulls. 6-pages.
5. Giess, L. K.; B. R.Jensen, R. L. Weaber, J. M. Bormann, and W. A. Fiske. 2018 Feet and Leg Traits are Moderately to Lowly Heritable in Red Angus Cattle. Kansas Agricultural Experiment Station Research Reports: Vol. 4: Iss. 1. <https://doi.org/10.4148/2378-5977.7533>
6. Leal, W. S.; R. F. Costa, L. L. Cardoso, F. S. Mendonça, F. F. Cardoso, M. J. Yokoo and R. L. Weaber. 2018. Bio-economic Model Predicts Economic Values for Beef Production," Kansas Agricultural Experiment Station Research Reports: Vol. 4: Iss. 1. <https://doi.org/10.4148/2378-5977.7534>
7. Saatchi, M., R. L. Fernando, L. Hyde, S. McGuire, W. Shafer, M. L. Spangler, and B. Golden. 2018. Empirical progeny equivalent of genotyped animals in a multi-breed beef cattle genetic evaluation using a single-step Bayesian regression model. Iowa State Beef Cattle Report.
8. Weaber, R. L. 2018. Weaning weight differences of calves on cows being fed an Altosid IGR mineral supplement versus control. Wellmark Study #5346 Final Report. Submitted to Wellmark International, Dallas, Texas. September 15, 2018.
9. Weaber, R. L., B. Jensen, L. Giess, W. Fiske, N. Bello and J. Bormann. 2018. Development of a National Genetic Evaluation System for Feet and Leg Conformation in Beef Cattle: Final Report. Red Angus Association of America.

### **Extension publications:**

1. Miller, S. 2018. Parental Influence. By the Numbers - Angus Journal, June:34.
2. Miller, S. 2018. The power of the database. By the Numbers - Angus Journal, April:59-60.
3. Miller, S. 2017. Angus GS, a new genomic era for American Angus. By the Numbers - Angus Journal, November:72,74,77.
4. Spangler, M.L. 2018. Recent changes to National Cattle Evaluation. eBEEF.org



## Presentation/Symposia:

1. Culbertson, M.M, S.E. Speidel and R.M. Enns. 2018. Approaches for evaluating the relationship between feedlot and pasture intake. Beef Improvement Federation Annual Convention. Loveland, CO.
2. Fonseca, P.A., S. Id-Lahoucine, J. Casellas, F. Miglior, A. Reverter, M. R. Fortes, L. T. Nguyen, L.R. Porto-Neto, M. Sargolzaei, L.F. Brito, S.P. Miller, F.S. Schenkel, M. Lohuis, J.F. Medrano and A. Canovas. 2018. Functional Characterization of Genes Mapped in Transmission Ratio Distortion Regions of the Bovine Genome Affecting Reproduction. American Society of Animal Science Midwest section meeting, Omaha NE. J. Anim. Sci. 96(suppl\_2):13-14.
3. Gondro, C. (2018). Feature selection for genomic prediction. 11th BIF Genetic Prediction Workshop.
4. Gondro, C. (2018). Genomic Technologies, Artificial Intelligence and Livestock Production. International Symposium on future Agricultural Science.
5. Id-Lahoucine, S., P. Fonseca, F. Miglior, M. Sargolzaei, L.F. Brito, S.P. Miller, F.S. Schenkel, V.H. Asselstine, J.P. Chesnais, M. Lohuis, J.F. Medrano and A. Canovas. 2018. Unravelling genomic regions with transmission ration distortion: identification of candidate lethal alleles in cattle. American Society of Animal Science Midwest section meeting, Omaha NE. J. Anim. Sci. 96(suppl\_2):13-14.
6. Id-Lahoucine, S., J. Casellas, F. Miglior, P.A.S. Fonseca, A. Suarez-Vega, M. Sargolzaei, S. Miller, F. Schenkel, J.F. Medrano and A. Canovas. 2018. Non-Mendelian segregation patterns across the Holstein genome: discovering candidate genomic regions affecting reproduction success. Southern Ontario Reproductive Biology Conference. Guelph, ON.
7. Lourenco, D.A.L. 2018. Big data in breeding and genetics: looking into the dimensionality of genomic information. Invited presentation given at the IX International Symposium on Genetics and Breeding. Viçosa, Brazil.
8. Lourenco, D.A.L. 2018. Single-step GBLUP in practice: applications in beef and other industries. Invited presentation given at 11th Beef Improvement Federation Genetic Prediction Workshop. Kansas City, Missouri.
9. Lourenco, D.A.L. 2018. Understanding Animal Breeding and Genetics. Invited presentation given at the Seriola Workshop, La Jolla, CA.
10. Lourenco, D.A.L. and J. Segers. 2018. Utilizing Technology in Beef Production: Advances in Live Animal Evaluation and Selection. Joint Invited Extension presentation given at the Sunbelt Expo. Moultrie, Georgia. [Extension Talk]
11. Lourenco, D.A.L., B.O. Fragomeni, S. Tsuruta, and I. Misztal. 2018. Selection to mitigate heat stress in pigs. Invited presentation given at the 2018 American Society of Animal Science Annual Meeting. Vancouver, Canada.
12. Lourenco, D.A.L., B.O. Fragomeni, S. Tsuruta, and I. Misztal. 2018. How genomics can help to identify resilient animals under environmental stress conditions. Invited

- presentation given at the 7th International Symposium on Animal Functional Genomics. Adelaide, Australia.
13. Lourenco, D.A.L., S. Tsuruta, B.O. Fragomeni, Y. Masuda, I. Aguilar, A. Legarra, S. Miller, D. Moser, I. Misztal. 2018. Single-step genomic BLUP for national beef cattle evaluation in US: from initial developments to final implementation. Invited presentation given at the 11th WCGALP, Auckland, New Zealand.
  14. Lourenco, D.A.L., S. Tsuruta, I. Misztal. 2018. Genomic Selection: Benefits, current status, and lessons from commercial implementation. Invited presentation given at the Aquaculture Canada 2018. Quebec City, Canada.
  15. Lourenco, D.A.L., S. Tsuruta, I. Pocrnic, A. Legarra, B.O. Fragomeni, Y. Masuda, I. Aguilar, S. Miller, D. Moser, I. Misztal. 2018. Developments in single-step for beef cattle genomic evaluation in the US. Invited presentation given at the 50th Beef Improvement Federation Research Symposium and Convention. Loveland, Colorado.
  16. Miller, S.P. 2018. Genetic evaluation at Angus Genetics Inc. 11th Beef Improvement Federation Genetic Prediction Workshop. Dec 5, Kansas City, MO.
  17. Miller, S.P. 2018. New breeding goals in beef cattle. Breeding and genetics symposium – new breeding goals in animal breeding. American Society of Animal Science / Canadian Society of Animal Science Joint Annual Meeting. Vancouver, BC.
  18. Miller, S.P. 2018. Single Step – Its pretty much what Mendel said, but maybe not what you thought. Beef and Lamb Genetics Sheep Breeders Forum – Dunedin New Zealand, July 3.
  19. Miller, S.P. 2018. Experiences with Single-Step at American Angus – 1 year in. Beef Improvement Federation Annual Research Symposium. June 22, Loveland CO.
  20. Miller, S.P. 2018. Developing selection tools at American Angus. New Zealand Angus Breeder’s Seminars – Timaru (Feb 6) and Taupo (Feb 9)
  21. Miller, S.P. 2017. Panel participant: International Genomics Symposium, 2017 Angus Convention, Fort Worth, TX, Nov 4-6.
  22. Miller, S.P. 2017. EPD 401. Merk Angus University, 2017 Angus Convention, Indianapolis, IN., Nov 4-6.
  23. Miller, S.P. 2017. Building better genomic predictions for Angus cattle. Annual research meeting of the multistate research coordinating committee and information exchange group NCERA225: Implementation and strategies for national beef cattle genetic evaluation. Manhattan, KS. Oct. 18-19.
  24. Miller, S.P. 2017. After 7/7 - Genomic Implementation at AGI. National Beef Cattle Evaluation Consortium “Brown bagger” webinar series. Oct 4. Misztal, I. (2018). Animal breeding at UGA. In Seminar at China Agricultural University. Beijing, China
  25. Misztal, I. (2018). Computing methods in animal breeding using the DNA information. In Seminar at Warsaw Tech. Warsaw, Poland
  26. Misztal, I. (2018). Extension of single-step ssGBLUP to many genotyped individuals. In World Congress on Genetics Applied to Livestock Production. Auckland, New Zealand

27. Misztal, I. (2018). International bull evaluation by GBLUP with prediction population(s). In Ignacy Misztal. Dubrovnik, Croatia
28. Misztal, I. (2018). Possible implications of limited dimensionality of genomic information. In Agricultural Biosciences International Conference. Wifang, China
29. Misztal, I. (2018). Possible implications of limited dimensionality of genomic information. In EAAP Mtg. Dubrovnik, Croatia
30. Misztal, I. (2018). Progress in genomic selection. In Workshop on Animal Genetics and Breeding in the Genomic Era. Taian, China
31. Misztal, I. (2018). Studies in genetics of heat stress in dairy, beef and pigs. In Plant and Animal Genome Mtg. San Diego, CA
32. Spangler, M. L. 2018. \$Indexes 101, American Angus Association annual Convention, Columbus, OH, 2018.
33. Spangler, M. L. 2018. American Hereford Association Board Discussion: Current and future genetic selection tools, Kansas City, MO, 2018.
34. Spangler, M. L. 2018. Application of advanced genetic technology in beef cattle. King Ranch Institute for Ranch Management, Kissimmee, FL, 2018.
35. Spangler, M. L. 2018. Ask Not what your NCE can do you for, ask what you can do for your NCE, American Simmental Association Fall Focus, Bozeman, MT, 2018.
36. Spangler, M. L. 2018. Beef cattle genetics, Kasakstan delegation, Lincoln, NE, 2018.
37. Spangler, M. L. 2018. Big data = better beef, Agricultural Economic and Technology summit, Kearney, NE, 2018.
38. Spangler, M. L. 2018. Breed differences for growth and carcass traits, Brazil Cochran scholars, Lincoln, NE, 2018.
39. Spangler, M. L. 2018. Bull selection workshop, Beef Improvement Federation annual meetings, Loveland, CO, 2018
40. Spangler, M. L. 2018. Bull selection—balancing EPDs, genomics, indexes, performance and structure, National Cattlemens Beef Association Cattlemens College, Phoenix, AZ, 2018.
41. Spangler, M. L. 2018. Current trends in beef cattle genetic evaluation. Midwest American Society of Animal Science meetings, Omaha, NE, 2018.
42. Spangler, M. L. 2018. Decision support using customizable indices across breeds, Beef Improvement Federation Genetic Prediction Workshop, Kansas City, MO, 2018.
43. Spangler, M. L. 2018. EPDs and the use of genomics in beef cattle selection, ABS Global South American Tour, Lincoln, NE, 2018.
44. Spangler, M. L. 2018. Extension in Animal Science, UNL Animal Science departmental seminar, Lincoln, NE, 2018.
45. Spangler, M. L. 2018. Genetic considerations for the cowherd, NE Ranch Practicum, Whitman, NE 2018 (via distance).
46. Spangler, M. L. 2018. Genetic selection for efficiency, State of Beef Conference, North Platte, NE, 2018.

47. Spangler, M. L. 2018. Genetic selection of livestock: Why it matters to you, Bair Ranch community lecture, Montana State University, Bozeman, MT, 2018.
48. Spangler, M. L. 2018. Genetic selection principles, American Akaushi convention, San Marcos, TX, 2018.
49. Spangler, M. L. 2018. Genetic Selection Tools Used in the U.S. beef Industry, Argentina Seedstock Tour, Lincoln, NE, 2018
50. Spangler, M. L. 2018. Genetic technologies on the horizon, National Cattlemens Beef Association Cattlemens College, Phoenix, AZ, 2018.
51. Spangler, M. L. 2018. Genomic selection: Historical perspective and development of methods in use today, American Society of Animal Science annual meetings, Vancouver, BC, CA, 2018.
52. Spangler, M. L. 2018. Genomic selection: Practical lessons learned and mistakes made. Iowa State University Animal Science departmental seminar, Ames, IA, 2018.
53. Spangler, M. L. 2018. Impact of single-step on selection indices, Beef Improvement Federation annual meetings, Loveland, CO, 2018
54. Spangler, M. L. 2018. New International Genetic Solutions genetic evaluation (Panel discussion), Allied Genetic Resources meeting, Bozeman, MT, 2018.
55. Spangler, M. L. 2018. Past, present, and future approaches to genomic selection, Bair Ranch technical lecture, Montana State University, Bozeman, MT, 2018.
56. Spangler, M. L. 2018. Putting the tools to use: Selecting your next bull. National Cattlemens Beef Association webinar. 2018
57. Spangler, M. L. 2018. Quantitative genetics/genomics research at the University of Nebraska-Lincoln, Departmental seminar, Pirassununga, Brazil.
58. Spangler, M. L. 2018. Selection indexes 101 and beyond, National Beef Cattle Evaluation Consortium Brown Bagger webinar series, 2018.
59. Spangler, M. L. 2018. The role of Brahman in crossbreeding and the beef industry, V8 ranch workshop, Wharton, TX, 2018.
60. Spangler, M. L. 2018. Use of genomic-enhanced EPDs to improve beef quality, Cattlemens workshop, La Grande, OR, 2018.
61. Spangler, M. L. 2018. Use of genomics in bovine genetic selection and utilization of genomics in other ag sectors, American Association of Bovine Practitioners webinar, 2018.
62. Spangler, M. L. 2018. Using genomics and genomically enhanced EPDs in your cow-calf operation, University of WI extension webinar, 2018.
63. Speidel, S.E. 2017. Animal Performance: EPD vs Phenotype. Leachman cattle of Colorado, Loma Bull Sale. Loma, CO.
64. Speidel, S.E. 2018. Development and Implementation of Pulmonary Arterial Pressure EPD. 50th Beef Improvement Federation Annual Convention. Loveland, CO.
65. Speidel, S.E. 2018. Genetic Predictions for Pulmonary Arterial Pressure. Pulmonary Arterial Pressure Summit, Fort Collins, CO.

66. Speidel, S.E. 2018. Genetic Predictions for Pulmonary Arterial Pressure. NBCEC Brown Bagger Series.
67. Speidel, S.E. 2018. Pulmonary Arterial Pressure EPD: What drives differences in predictions. Leachman Cattle of Colorado, Annual Bull Sale. Wellington, CO.
68. Suarez-Vega, A., S. Id-Lahoucine, J. Casellas, P.A.S. Fonseca, M. Sargolzaei, S. Miller, F. Schenkel, J.F. Medrano, F. Miglior and A. Canovas. 2018. Evaluation of the biological function of genes linked to regions with distortion of Mendelian segregation and their relation to reproductive traits in cattle. American Society of Animal Science / Canadian Society of Animal Science joint annual meeting. Vancouver, BC.
69. Suarez-Vega, A., F. Miglior, S. Id-Lahoucine, J. Casellas, P.A.S. Fonseca, M. Sargolzaei, S. Miller, F. Schenkel, J.F. Medrano and A. Canovas. 2018. Determining the functional consequences of distortion of Mendelian segregation on reproductive traits by combining results from SNP-by-SNP and haplotype analyses. Southern Ontario Reproductive Biology Conference. Guelph, ON
70. Weaber, R. L. and M. L. Spangler. 2018. Application of advanced genetic technology in beef cattle. King Ranch Institute of Ranch Management. Kissimmee, FL. February 2018
71. Weaber, R. L. Cattle Structure & Mobility: A Genetics and Management Update. National Cattlemen's Beef Association, Cattlemen's College. January 31, 2018. Phoenix, Arizona. (T)
72. Weaber, R. L. EPDs 101. Texas A&M Beef Cattle Short Course. August 7, 2018. College Station, TX. (T)
73. Weaber, R. L. Genetic parameter estimates for feet and leg traits of Red Angus cattle. Kansas Red Angus Association Field Day. September 21, 2018. Manhattan KS. (T)
74. Weaber, R. L. Getting it right-proper contemporary grouping strategies for beef cattle performance programs. Beef Improvement Federation Annual Meeting and Research Symposia, June 20, 2018. Loveland, Colorado. (T)
75. Weaber, R. L. Heterosis importance to the industry. Am. Shorthorn Association Annual Meeting, December 1, 2017. Kansas City, MO. (K)
76. Weaber, R. L. Selection for improved feed efficiency across the beef value chain. June 14, 2018. GENEX Argentina Tour Group, Manhattan, KS.
77. Weaber, R. L. Selection for improved feed efficiency across the beef value chain. January 9, 2018. Suther Feed's Tech Service/Sales Conference. Manhattan, Kansas (K)
78. Weaber, R. L. Selection of replacement heifers. Purina National Seedstock Supplier Meeting. July 16, 2018. Grey's Summit, Missouri. (K)
79. Weaber, R. L. Strategies for Maximizing EPD IMPACT. Kentucky Seedstock Symposium. April 25, 2018. Shelbyville, KY. (K)
80. Weaber, R. L. The 4 S's of Crossbreeding: Simple, Structured, Successful, and Sustainable. National Cattlemen's Beef Association Genetics Webinar Series. March 14, 2018.
81. Weaber, R. L. The application of genomics for genetic improvement in commercial and seed stock beef herds. 20th Annual MAC Regional Dairy Extension In-service. May 31, 2018. Wilkes-Barre, PA. (T)

82. Weaber, R. L. What is Genomics and How Does it Help? Kentucky Seedstock Symposium.  
April 25, 2018. Shelbyville, KY. (K)

**NCERA-225**  
**Implementation and Strategies for National Beef Cattle Genetic Evaluation**  
**2018 Meeting Minutes**

**December 4-6, 2018**  
**KCI Expo Center, Kansas City, Missouri**

**Chair:** Dr. Larry Kuehn  
**Secretary:** Dr. Robert Weaber

The meeting was called to order by Chairman Kuehn at approximately 6:30 PM on Tuesday, December 4, 2018.

Chairman Kuehn briefly reviewed the programmatic schedule for the joint NCERA-225/BIF Genetic Prediction Workshop.

Roll was taken of the attendees present at the business meeting. Those attending were: Speidel, Golden, Hyde, Bradford, Weaber, Decker, Thallman, Kuehn, Spangler, Snelling, Tempelman, Saatchi, Bennett, Miller, Cassady (AA), Gondro, Lourenco, Kachman, Garcia, Bullock, Devani, Atkins, and Rolf.

**Old Business:**

No old business was presented to the meeting floor.

**New business:**

Weaber and Thallman briefly reviewed the agenda (attached pdf) and objectives of the NCERA-225/Beef Improvement Federation Genetic Prediction Workshop. Dr. Thallman commented, "The primary purpose of this workshop is to share experiences and ideas regarding the refinements of genomic evaluation and selection indices in a more technical forum than is appropriate for the Annual Beef Improvement Federation Convention. Much progress has been made in the last few years, but there is much more to be learned and done."

Thallman and Weaber encouraged NCERA-225 members to provide questions during the planned discussion time to ensure that ideas were adequately reviewed and explored. Weaber provided a brief overview of the agenda frame work and a number of house-keeping items related to meals and AV at the venue. Full GPW meeting coverage will be provided at <https://beefimprovement.org/library-2/genetic-prediction-workshop>. Coverage includes video/audio recordings of presentations and pdf copies of the presenter slides. Proceedings will also be made available via the BIF GPW web page.

The group then took up discussion of the 2019 NCERA-225 meeting. Dr. Heather Bradford, Virginia Tech, offered to host the event in 2019, date TBD, in Blacksburg, VA.

2019 officers were elected by acclamation. Dr. Heather Bradford was elected as chairperson of the committee and Dr. Gota Morota, Virginia Tech (formerly University of Nebraska-Lincoln) will serve as secretary.

Dr. Darrh Bullock moved for adjournment at 7:15 PM

Respectfully submitted,

A handwritten signature in black ink that reads "Robert L. Weaber". The signature is written in a cursive style with a long, sweeping underline.

Dr. Robert L. Weaber,

Professor,

Kansas State University





# **BIF Genetic Prediction Workshop**

## **NCERA-225 (Regional Committee on Implementation and Strategies for National Beef Cattle Genetic Evaluation)**

*Holiday Inn KCI Airport and KCI Expo Center  
Kansas City, Missouri*

### ***Joint Meeting Schedule of Events***

#### **Tuesday, December 4, 2018**

6:30 p.m. NCERA-225 Business meeting- *Lobby Court – Expo Center*

#### **Wednesday, December 5, 2018**

7:00 a.m. Breakfast Buffet – *Salon ABC – Expo Center*

8:00 a.m. Technical Presentations and Discussion – *Ambassador – Expo Center*

*An Historical Introduction to the Genetic Prediction Workshop – Dr. Stewart Bauck, Neogen/GeneSeek*

*Setting the Stage – Dr. Mark Thallman, USDA-ARS U.S. Meat Animal Research Center*

*Migrating the BIF guidelines to a Wiki Environment – Dr. Lauren Hyde, Am. Simmental Association/International Genetic Solutions*

*Upcoming Challenges in Genetic Evaluation from a Statistician's Perspective – Dr. Steve Kachman, University of Nebraska-Lincoln*

*Genetic Evaluation at Angus Genetics, Inc. – Dr. Steve Miller, Am. Angus Association/Angus Genetics, Inc.*

*Genetic Evaluation at Neogen – Mr. John Genho, Neogen/GeneSeek*

*Morning Break*

*Genetic Evaluation at International Genetic Solutions – Dr. Mahdi Saatchi, Am. Simmental Association/International Genetic Solutions*

*Genetic Evaluation at the American Hereford Assn. – Mr. Shane Bedwell, Am. Hereford Association*

*Vision of the Future from Neogen – Dr. Stewart Bauck, Neogen/GeneSeek*

*Vision of the Future from Zoetis – Dr. Sue DeNise, Zoetis*

*Discussion of Genetic Evaluation and Genomics Company Updates – Moderator: Dr. Darrh Bullock, University of Kentucky*

12:00 p.m. Lunch – *Salon ABC – Expo Center*

1:00 p.m. Technical Presentations and Discussion – *Ambassador – Expo Center*

*Single-step GBLUP in Practice - Dr. Daniela Lourenco, University of Georgia*

Current Research in Unweighted and Weighted ssGBLUP - *Dr. Ignacy Misztal, University of Georgia*

Current Single-step National Beef Cattle Evaluation Models Used by the American Hereford Association and International Genetic Solutions, Computational Aspects, and Implications of Marker Selection - *Dr. Bruce Golden, Theta Solutions LLC*

Discussion of Technical Aspects of Current Approaches to Genetic Evaluation - Moderator: *Dr. Darrh Bullock, University of Kentucky*

Reduced Subsets of SNP from the F250 Chip - *Dr. Warren Snelling, USDA-ARS U.S. Meat Animal Research Center*

Some Insights into the Quantitative Genetic Modeling of Feed Efficiency and its Implications for Multiple Trait Genomic Evaluations - *Dr. Rob Tempelman, Michigan State University*

Feature Selection for Genomic Prediction - *Dr. Cedric Gondro, Michigan State University*

Discussion of Benefits and Pitfalls of Marker Weighting - Moderator: *Dr. Darrh Bullock, University of Kentucky*

6:00 PM Reception (Cash Bar) – *Salon ABC – Expo Center*

7:00 PM Supper – *Salon ABC – Expo Center*

### **Thursday, December 6, 2018**

7:00 a.m. Breakfast Buffet – *Salon ABC – Expo Center*

8:00 a.m. Technical Presentations and Discussion – *Ambassador – Expo Center*

Challenges from Day 1: Taking Genomic Evaluation to the Next Level – *Dr. R. Mark Thallman, USDA-ARS U.S. Meat Animal Research Center*

Setting the Stage for Day 2 - *Dr. Bob Weaver, Kansas State University*

Review BIF Guidelines Revisions from Yesterday - *Dr. Lauren Hyde, Am. Simmental Association/International Genetic Solutions*

Would You Drive a Race Car Without Steering? – *Mr. Lee Leachman, Leachman Cattle of Colorado*

Decision Support Using Customizable Indices Across Breeds - *Dr. Matt Spangler, University of Nebraska-Lincoln*

Discussion of Application of Selection Indices – Moderator: *Dr. Darrh Bullock, University of Kentucky*

Genomic Analysis of Genotype by Nutritional Environment Interaction in a Crossbred Beef Cattle Herd - *Dr. El Hay, USDA-ARS Fort Keogh Livestock Range & Research Laboratory*

Mate Selection for the Implementation of Breeding Programs – *Dr. Brian Kinghorn, Emeritus Professor, University of New England, Australia*

Noon Adjourn