

AG2PI SEED GRANT - PROJECT FINAL REPORT

PROJECT NAME	Impact of breed type on beef production and sustainability
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PROJECT PRINCIPAL INVESTIGATOR	TODAY'S DATE	PROJECT START DATE	DATE OF COMPLETION
Kara Thornton	9/08/2023	12/01/2021	05/28/2023
TEAM MEMBERS (co-PI, co-I, personnel)	COLLABORATORS		
Brenda Murdoch, Gordon Murdoch, Sulaiman Matarneh	Tim Smith		

ACCOMPLISHMENTS

Please provide a short summary of the conclusions (both successes and failures) made from your project. Include a description of how this project will provide benefits to the agricultural genome to phenome community and, possibly, to a broader audience. You should include both qualitative and quantitative details, as necessary, to support your conclusions. Include a short accomplishment statement in non-technical language and do not include names.

- The main conclusions we have made from this research are:
 - Primary BSC isolated from BI-influenced animals have decreased proliferation and protein synthesis rates compared to BT cattle, which may be responsible for differences in animal performance that are typically observed between cattle of different breed types.
 - Several SNP within genes have been found to be associated with production traits, and differ between cattle of different breed types.
- A challenge, is that we haven't yet sequenced the DNA from the cell culture portion of the project, so there are still unknowns relating to what the genetic differences underlying the observed differences in growth, may be. However, there are still plans to complete this work. Genome sequencing in *in vitro* models has proven to be a little more difficult than initially anticipated.
- This project benefits the AG2P community by bringing together a diverse group of researchers with different skillsets to aid in the AG2P reaching their goal – to better understand how the genome and phenome are related to make improvements to agriculture as a whole. The collaborative team that was formed through this project plans to continue their collaborations and bring in other researchers to get at other aspects of the larger outcome (determining ways to improve sustainability of beef production). In addition to this collaborative team being built, the outcomes of the research that have been completed are of value to beef producers and can be used to help beef producers understand how selection for different genetics between cattle of differing breed types impacts production. Further, this information is valuable to the scientific community in that new SNP related to cattle production traits have been identified, but also that a basis for understanding why cattle of different breed types grow at different rates has been established in the *in vitro* models utilized in this study as well. Further, the student that has been working on this project, Ms. Lillian Okamoto, has had a great opportunity to broaden her understanding of genome to phenome as she is being trained as a more interdisciplinary scientist.

Accomplishment statement:

Completion of this seed grant has resulted in novel information related to differences in beef production between cattle of different breed types, new inter-disciplinary collaborations with plans to continue working on genome to phenome research, and training of a young scientist in an inter-disciplinary skillset.

Products

Please list any products from this project.

ACTIVITY / PRODUCT	DESCRIPTION (include URL, if applicable)	OUTCOME / METRICS
Presentation of research findings at AG2PI conference 2022	Flash talk	Shared research with attendees of AG2PI conference
AG2PI field day 2022	Flash talk shown electronically at AG2PI field day	Shared research with members of the AG2PI community and stakeholders at the AG2PI field day
Poster presentation by an undergraduate student, Ms. Bailee Brown, at the ASAS meeting 2022	B.L. Brown, L.A. Motsinger, C.C. Reichhardt, G.K. Murdoch, B.M. Murdoch, M.D. Garcia, K.J. Thornton. (2022). Effects of beef cattle breed type and steroid hormones on proliferation rates of bovine satellite cells.	Research shared with over 3,000 attendees at the ASAS meetings via peer-reviewed abstract and poster presentation
Poster presentation by an undergraduate student, Ms. Lillian Okamoto, at the ASAS meeting 2022	L.L. Okamoto, C.C. Reichhardt, A.F. Alberto, L.A. Motsinger, S.A. Bayles, B.W. Roholt, M.D. Garcia, K.J. Thornton. (2022). Effect of beef breed type relative to feedlot performance, feeding behavior, and carcass characteristics.	Research shared with over 3,000 attendees at the ASAS meetings via peer-reviewed abstract and poster presentation
Poster presentation by an undergraduate student, Ms. Lillian Okamoto, at the ADVS departmental research symposium 2022	L.L. Okamoto, C.C. Reichhardt, A.F. Alberto, L.A. Motsinger, S.A. Bayles, B.W. Roholt, M.D. Garcia, K.J. Thornton. (2022). Effect of beef breed type relative to feedlot performance, feeding behavior, and carcass characteristics.	Research shared with over 100 students and faculty from across USU and the community (extension personnel, livestock producers, industry stakeholders) via abstract and poster presentation
Poster presentation by an undergraduate student, Ms. Bailee Brown, at the ADVS departmental research symposium 2022	B.L. Brown, L.A. Motsinger, C.C. Reichhardt, G.K. Murdoch, B.M. Murdoch, M.D. Garcia, K.J. Thornton. (2022). Effects of beef cattle breed type and steroid hormones on proliferation and protein synthesis rates of bovine satellite cells.	Research shared with over 100 students and faculty from across USU and the community (extension personnel, livestock producers, industry stakeholders) via abstract and poster presentation
Oral Presentation by Dr. Kara Thornton at Utah beef field day 2023	The findings of this research were shared with beef producers, extension personnel, and other industry stakeholders at the Utah Beef Field Day in 2023	Research shared with over 200 members of the beef community in Utah via an oral presentation given by Kara Thornton
Poster presentation at AG2I conference 2023	Poster presentation by the PI and student, Ms. Lillian Okamoto.	Research findings shared with members of the AG2PI community

Poster presentation by a graduate student, Ms. Lillian Okamoto, at the ASAS meeting 2023	L.L. Okamoto, M. Stagemiller, C.C. Reichhardt, A.F. Alberto, L.A. Motsinger, S.A. Bayles, B.W. Roholt, M.D. Garcia, B.M. Murdoch, K.J. Thornton. (2023). Genetic differences related to beef production traits in <i>Bos taurus</i> or <i>Bos indicus</i> influenced cattle.	Research shared with over 3,000 attendees at the ASAS meetings via peer-reviewed abstract and poster presentation
Poster presentation at USU ADVS research symposium 2023	L.L. Okamoto, M. Stagemiller, C.C. Reichhardt, A.F. Alberto, L.A. Motsinger, S.A. Bayles, B.W. Roholt, M.D. Garcia, B.M. Murdoch, K.J. Thornton. (2023). Genetic differences related to beef production traits in <i>Bos taurus</i> or <i>Bos indicus</i> influenced cattle.	Research shared with over 100 students and faculty from across USU and the community (extension personnel, livestock producers, industry stakeholders) via abstract and poster presentation
Manuscript	A manuscript detailing the work of the cattle performance and GWAS study is in progress	Research findings will be shared with the scientific community
Manuscript	A manuscript detailing the findings of the primary bovine satellite cell research is currently in progress	Research findings will be shared with the scientific community

Audience

With whom has this work been targeted to and shared? Please describe how this project and its products have been disseminated to a community of interest. Include any outreach activity or information sharing as well as training or professional development opportunities provided in this project.

This project has been shared with members of the scientific community through presentation at AG2PI conferences and also national ASAS meetings. In addition, the findings of the research have been shared locally at USU to students, faculty, staff and members of the community (extension personnel, livestock producers, industry stakeholders). In the future, we plan to disseminate the research via two different manuscripts to the scientific community. In addition, the research will also result in at least 1 extension fact sheet that can be shared with livestock producers. Further, once all of the data has been published in manuscripts, it will be made publicly available on the USU website.

CONTINUATION OF WORK

Next steps

How do you/your team plan to continue moving this project forward? Include how AG2PI can assist in your forward momentum.

In the immediate future (the next few months) we should have all of the data from this project collected and analyzed and out for publication. Once we have all of the data, we plan to expand our current collaborative team to be even more inter-disciplinary to gain more insight on other aspects of beef production (environmental impacts, economic impacts, etc.) in order to answer the G2P questions plaguing the beef industry from a more systems-based approach.