

Additional Project Outputs for OREI 2020-51300-32196

A Multiregional Approach to Balancing Milk and Forage Quality in Organic Dairies Feeding High-legume Diets

Farmer resources:

- *INSPIRED Dairy Report*. University of New Hampshire, College of Life Sciences and Agriculture. 2021. <https://colsa.unh.edu/nhaes/dairyreport2021>. Several articles on dairy cow nutrition, supplementation, and health, including Brito, A.F., M. J. Lange, J. P. Sacramento, L. H. P. Silva, M. Ghelichkhan, Y. Geng, D. C. Reyes, and M. A. Zambom. 2021. *Alfalfa-grass or red clover-grass: Effects on milk production, composition, nitrogen and energy utilization*, from this project.
- New England Dairy Nutrition Conference (Virtual). March 11, 2021. Full program, links to videos at <https://www.northeastalliance.com/2021nedairynutritionconference>. Includes Smith, R.G. *Cover Crops: What's the Big Deal?* from this project.

Journal articles:

- Zamudio, D., R. A. De Castro, A. P. Jimenez-Lagos, M. V. S. B. Cardoso, M. A. Killerby, G. Pereira, M. R. M. Lima, C. Knight, and J. J. Romero. 2025. *Effects of wilting extent on the concentration of phytoestrogens, nutritional value, microbial populations, and in vitro ruminal methane emissions of red clover hay and silage across stages*. *J. Dairy Sci.* 108:8391–8409. <https://doi.org/10.3168/jds.2025-26321>. *Open access*.
- Mandal, P., M. R. M. Lima, A. K. Wallingford, N. D. Warren, A. F. Brito, and R. G. Smith. 2025. *Short-term exposure to elevated temperature and CO₂ alters phytoestrogen production in red clover*. *Sci. Rep.* 15:9105. <https://doi.org/10.1038/s41598-025-92250-y>. *Open access*.
- Leon-Tinoco, A. Y., M. Garcia, C. Stonoha-Arther, A. F. Brito, and J. J. Romero. 2025. *Factors influencing protein utilization in legume silage and hay for ruminants*. *Grass Forage Sci.* 80:e12729. <https://doi.org/10.1111/gfs.12729>. *Paywall*.
- Mandal, P., D. A. Mortensen, A. F. Brito, A. K. Wallingford, M. R. M. Lima, N. D. Warren, and R. G. Smith. 2024. *Water stress influences phytoestrogen levels in red clover (*Trifolium pratense*) but not kura clover (*T. ambiguum*)*. *J. Agric. Food Chem.* 72:10247-10256. <https://pubs.acs.org/doi/10.1021/acs.jafc.4c00300>. *Paywall*.
- Warren, N. D., D. A. Cox, and R. G. Smith. 2023. *Effects of soil amendments on hairy vetch no-till interseeded into a hayfield*. *Agronomy J.* 115:887-895. <https://doi.org/10.1002/agj2.21249>. *Paywall*.
- Teixeira, C. D., B. T. Castillo, L. Bernhardt, N. D. Warren, C. Petry, J. G. Ernakovich, R. G. Smith, and S. D. Frey. 2023. *Frequent defoliation of perennial legume-grass bicultures alters soil carbon dynamics*. *Plant Soil* 490:423-434. <https://link.springer.com/article/10.1007/s11104-023-06091-7>. *Paywall*.

Theses and dissertations:

- Ativor, Isaac. 2025. *Evaluating the effects of agricultural management practices on beneficial arthropod communities*. University of New Hampshire. Ph.D. Dissertation. <https://scholars.unh.edu/cgi/viewcontent.cgi?article=3898&context=dissertation>.
- Diego Zamudio Ayala. 2023. *Effects of Wilting Extent on the Phytoestrogen Levels, Nutritional Value, Microbial Populations, and In Vitro Ruminal Methane Emissions of Red Clover Hay and Silage Across Stages*. University of Maine, Orono, ME (M.S. thesis; August, 2023). <https://digitalcommons.library.umaine.edu/etd/3839>.
- Konopka, A. L. 2023. *Replacing Ground Corn With Liquid Molasses In Diets Of Jersey Cows Fed Red Clover Baleage: Effects On Milk Production, Nitrogen Efficiency, Energy Utilization, And Enteric Methane Emissions*. University of New Hampshire, Durham, NH (M.S. thesis; September, 2023). <https://scholars.unh.edu/thesis/1765>.
- Mumford, M. 2023. *An Economic Analysis to Feeding Legume Forages to Organic Dairy Cows*. University of Minnesota, Minneapolis, MN (M.S. thesis; November, 2023) <https://hdl.handle.net/11299/262857>.

Conference papers, abstracts, posters:

- J. Garzon, D. Zamudio, M. R. M. Lima, R. A. de Castro, A. P. Jimenez, M. V. Cardoso, C. Knight, and J. J. Romero. 2023. *Effects of curing extent on the phytoestrogen levels of red clover hay and silage across storage phases*. American Society of Agronomy, Crop Science Society of America and Soil Science Society of America International Annual Meeting, Oct. 29-Nov.01, St. Louis MO (Poster presentation). <https://scisoc.confex.com/scisoc/2023am/meetingapp.cgi/Paper/149207>. Open access (abstract)
- Mandal, P., Mortensen, D., Brito, A.F., Lima, M.R.M., Warren, N.D., and Smith, R.G. 2023. *Soil Moisture stress influences phytoestrogen concentrations in forage legumes*. American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America International Annual Meeting, Oct. 29-Nov.01, St. Louis, MO. (Oral presentation) <https://scisoc.confex.com/scisoc/2023am/meetingapp.cgi/Paper/152324>. Open access (abstract).
- Mandal, P., Warren, N.D., Lima, M.R.M., Brito, A.F., and Smith, R.G. 2024. *Influence of defoliation frequency and severity on phytoestrogen concentrations in red clover and white clover*. Annual Graduate Conference April 15, University of New Hampshire, Durham, USA. (Oral presentation), https://media-gallery.unh.edu/media_submission/1358/?added_year=2024&conference=1&judge_group=8. Open access – abstract and ppt slides.
- Lange, M. J., L. H. P. Silva, M. Zambom, K. J. Soder, and A. F. Brito. 2024. *Feeding alfalfa-grass or red clover-grass mixture baleage: Effect on milk yield and composition, relative abundance of ruminal microbiota taxa, and nitrogen and energy utilization in dairy cows*. J. Dairy Sci. 107:2066-2086. [https://www.journalofdairyscience.org/article/S0022-0302\(23\)00756-7/fulltext](https://www.journalofdairyscience.org/article/S0022-0302(23)00756-7/fulltext). Open access.

- Ativor, I.N., Warren, N.D., Smith, R.G. 2022. *Optimizing the potential of perennial forage legumes as floral resource reservoirs for beneficial insects*. ASA, CSSA, SSSA International Annual Meeting, Baltimore, MD.
<https://scisoc.confex.com/scisoc/2022am/meetingapp.cgi/Paper/145127>. Open access (abstract).
- Warren, N.D., Brito, A.F., Smith, R.G. (2022) *Species selection and management drive legume persistence in a perennial forage biculture system*. ASA, CSSA, SSSA International Annual Meeting, Baltimore, MD.
<https://scisoc.confex.com/scisoc/2022am/meetingapp.cgi/Paper/145971>. Open access (abstract).
- Mandal, P., Lima, M.R.M., Brito, A.F., Smith, R.G. (2022) *Drivers of phytoestrogens in perennial forage legumes and potential implications for dairy production: a review*. ASA, CSSA, SSSA International Annual Meeting, Baltimore, MD.
<https://scisoc.confex.com/scisoc/2022am/meetingapp.cgi/Paper/144758>. Open access (abstract).
- Hartman, L., Warren, N.D., Smith, R.G., Mortensen, D. (2022) *Effects of perennial polyculture management on the weed seedbank community*. ASA, CSSA, SSSA International Annual Meeting, Baltimore, MD.
<https://scisoc.confex.com/scisoc/2022am/meetingapp.cgi/Paper/146151>. Open access (abstract).