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8-14-2017

## Economic and Environmental Sustainability of Heifer Development Strategies in Pasture-Based Organic Dairy Systems

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### Recommended Citation

Isom, S. C. (2017). Economic and Environmental Sustainability of Heifer Development Strategies in Pasture-Based Organic Dairy Systems. Utah State University. <https://doi.org/10.15142/T3WW6N>

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## **DATA MANAGEMENT PLAN**

### **OREI 2017: Economic and environmental sustainability of heifer development strategies in pasture-based organic dairy systems**

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#### **Expected Data Type**

Data for this project will be exclusively "new" data that will be generated in a variety of ways: field work and observations, laboratory analyses, and modeling.

Most data will be distilled down to numerical forms that will be organized and stored in Microsoft Excel spreadsheets.

Data processing will be minimal, with possible exceptions being some kind of transformation or other pre-statistical analysis processing to ensure that the data are in a format that is appropriate for the statistical models to be applied.

There is investigator redundancy built in at just about every level of our experimental approach; cooperating investigators will review data together as it is collected and recorded to ensure that accuracy is maintained.

#### **Data Format**

As mentioned previously, the vast majority of the data collected for this project will ultimately be distilled down to a numerical format of some sort. These data points will be organized and stored in "standard" two-dimensional spreadsheet format. Our investigators all have access to and will utilize Microsoft Excel for recording and organizing data.

We feel it is important to catalogue and store essentially ALL of the raw data as well as and processed data that results from the project. Because our data will be limited to a discrete, relatively small number of observations (i.e. not "-omics" data) and will all be distilled into a 'flat' 2D format, long-term storage will not be an issue.

No real data processing will be needed for long-term storage. Just organization as described above.

In addition to their standard laboratory notebooks (which, it will be emphasized, should be maintained meticulously according to standard scientific practice), all lab personnel will be asked to organize, summarize, and transpose their methods for data collection, analysis, and interpretation into an electronic format. These "e-notebooks" will ideally be kept and secured in password-protected Microsoft OneNote notebooks (or similar product). These notebooks will not replace standard lab notebooks, but will provide a more organized, legible, SEARCHABLE, and SHAREABLE form of documentation for all experimental procedures. For long-term

storage, text and/or figures from these e-notebooks will be copied into flat text files and embedded with or next to data files and results.

Especially for a multi-disciplinary and integrated project like this, it is unlikely that a single metadata standard will be acceptable for every aspect of our project. We will work closely with our data management specialist to determine whether or not there is a single format that will work for all of our research and outreach activities. Dublin Core and/or Darwin Core are likely candidate formats.

## **Data Storage and Preservation**

Raw, curated, processed, and/or analyzed data and presentations will be stored locally and shared upon request. Upon publication, some data files pertinent to the analysis and/or interpretation of the research manuscript may be too large to fit in the paper itself. In such cases, these data files may be made available for viewing and/or download via a permanent institutional server with web access.

Long-term storage of the various parts and types of the data collected and presented here will be handled by the individual PI responsible for collecting, analyzing, and presenting the data.

## **Data Sharing and Public Access**

Generally speaking, the data we anticipate generating will be of the sort that we will *want it* to be immediately accessible to the producers, at least. So we do not expect any extraordinary restrictions on data access. At the same time, we will want/need to formally present and publish our research findings, and so it will be important to keep the actual data to ourselves until then. We pledge to get our data to presentation/publication in a reasonable amount of time: we anticipate having all data presented/published within two years of the project end date. After that time, data will be released to the public.

## **Roles and Responsibilities**

Dr. Isom, as PD for this project will assume ultimate responsibility for data management. Dr. Isom will serve as the primary data manager for the USU group; Dr. Blair Waldron will serve as primary data manager for the ARS-FRRL group. The UVM group should have little to no data to manage. Dr. Isom will have long-term custodianship of the animal science data; Dr. Waldron will maintain the crop science data; and Dr. Creech will maintain the extension/outreach materials.

Data management will be a topic of discussion on the agenda of Advisory Panel and Research Team meetings. Data storage and management will happen at local and institutional levels, and we do not anticipate any costs beyond what our institutions have already committed to provide for us.

## **Monitoring and Reporting**

We acknowledge that the project and the data management plan will be monitored as specified by NIFA, in initial, annual, and final reports, e.g. Dr. Isom will ultimately be responsible for reviewing and revising the DMP, as necessary