

Dairy and Livestock Methane Emissions Reduction Developing Research Prospectus

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The main purpose of the dairy research subgroup is to prioritize dairy research projects that improve our knowledge on:

- The accuracy of greenhouse gas (GHG) and other air pollutant emissions from California dairies
- The potential GHG emission reductions and air quality impacts (positive and negative) from implementation of methane mitigation strategies

The prospectus template that is presented in this document shall be used to propose research that address the knowledge gaps as outlined above. The California Air Resources Board (CARB) also prepared a supplemental research summary document that helps guide the development of individual research ideas that satisfies the agency's GHG emission and air quality research needs while meeting the objectives of this dairy research subgroup. In particular, the completed prospectus shall emphasize on its appropriateness and relative importance in achieving California's methane emission reduction goals. The completed prospectus will also provide guidance to other California funding agencies and organizations in prioritizing the research projects that would lead to effective development of policies and regulations to reduce methane emissions from California dairies while improving the local and regional air quality.

Research Prospectus Template

I. Research Question

- a. Describe the knowledge gap that needs investigation (what exactly is unknown?)
- b. Describe why the State will need this information in order to successfully meet its methane emission reduction goals
- c. Provide citations and references for related research in which the research question is built on (the proposed research must be novel and must satisfy the State's need to reduce methane emissions from California dairies)

II. Research Design

- a. Provide an overview of the study designed to address the research question(s) and the expected results
- b. Describe the specific knowledge gap that the results will address
- c. Methodology
 - i. Describe the specific dairy operation that will be studied in this research project
 - ii. Describe the specific method(s) that will be used to study the dairy operation (include descriptions of the field deployable analytical instruments, laboratory equipment, and or any other resources that are needed to complete this study)
 - iii. Provide a standard operating procedure for each of the methods
 - iv. Provide references that support the appropriateness of each of the methods being employed
 1. Describe the pros in using this method
 2. Describe the cons in using this method
 3. Describe any caveats for this method and for results that derive from this method
 - v. Describe the techniques to post-process and analyze the data that derives from this project (include information on software, models, and or algorithms that will be used)
 - vi. Describe quality control and quality assessment strategies that rely on statistics and standard operating procedures

III. Potential Limitations, Pitfalls, Obstacles, Etc.

- a. Describe the problems the research team may have to overcome in order to obtain sound, valid, and useful results, for instance:
 - i. Seasonal and diurnal variability

- ii. Generalizability of results to other dairies of the same type (or to the industry as a whole) in California
- iii. Variability of the results with respect to various California dairy operations
- iv. Obtaining permission to take measurements on a sufficient number of dairies
- v. Others

IV. *Duration of the Research Project*

- a. Timeframe required for:
 - i. Preparation for data collection
 - ii. Data collection
 - iii. Analysis
 - iv. Report
- b. Estimate of total duration from contract approval to submittal of final deliverable(s)

V. *Cost of the Research*

- a. Provide a range of the costs required to conduct this research:
 - i. Equipment
 - ii. Staff time
 - iii. Lease agreements (if any)
- b. If sub-contractors are needed, provide additional justifications

VI. *Additional Information:*

- a. Include any relevant information that was not covered in Sections I through V
- b. Provide resumes or CV's of individuals that are involved in the project