

**PROPOSED**

State of California  
CALIFORNIA AIR RESOURCES BOARD

**STRATEGIES TO REDUCE METHANE EMISSIONS FROM  
ENTERIC AND LAGOON SOURCES**

RESEARCH PROPOSAL

Resolution 18-10

**March 22, 2018**

Agenda Item No.: 18-2-3

WHEREAS, the California Air Resources Board (CARB or Board) has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code sections 38500 and 39700 through 39705;

WHEREAS, a research proposal, number 2816-288, titled "Strategies to Reduce Methane Emissions from Enteric and Lagoon Sources," has been submitted by the University of California, Davis for a total amount not to exceed \$114,995;

WHEREAS, the Research Division staff has reviewed Proposal Number 2816-288 and finds that in accordance with Health and Safety Code sections 39701, the results of this study will identify the potential and practicality of feedstock additives to reduce dairy emissions of methane; and

WHEREAS, in accordance with Health and Safety Code section 39705, the Research Screening Committee has reviewed and recommends funding the Research Proposal.

NOW, THEREFORE BE IT RESOLVED, that CARB, pursuant to the authority granted by Health and Safety Code section 39700 through 39705, hereby accepts the recommendations of the Research Screening Committee and staff and approves the Research Proposal.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the Research Proposal as further described in Attachment A, in an amount not to exceed \$114,995.

**Resolution 18-10**

March 22, 2018

**Identification of Attachments to Board Resolution 18-10**

**Attachment A:**

“Strategies to Reduce Methane Emissions from Enteric and Lagoon Sources”  
Summary and Budget Summary

## ATTACHMENT A

### “Strategies to Reduce Methane Emissions from Enteric and Lagoon Sources”

#### Background

The State of California launched the Short-Lived Climate Pollutant (SLCP) Reduction Strategy (Senate Bill 1383) with the objective of decreasing statewide CH<sub>4</sub> emissions by 40 percent by 2030 from 2013 levels. Over 50 percent of methane (CH<sub>4</sub>) emissions in the State are attributed to enteric fermentation and manure; therefore, achieving significant CH<sub>4</sub> emission reduction from these sources will be critical to meeting SB 1383 goals. Many management practices have been proposed to mitigate methane emissions from livestock operations. For instance, anaerobic digesters have been adopted as a manure management technology for cutting methane emissions and CARB is working in partnership with the dairy industry and other government agencies to identify and remove barriers for wide adoption of anaerobic digesters in California. Liquid-solid separation was also proposed as an alternative manure management practice and is being tested and evaluated for its methane reduction potentials. California-specific models for characterizing diet and enteric emissions are being developed that would improve the methane inventory and guide feed management. This proposal is focused on potential additive use as another strategy to reduce methane emissions from enteric and manure sources.

The project will conduct a thorough review of literature data on additive uses in animal feed and lagoons, and evaluate holistically their potential effectiveness and feasibility from California perspectives, by taking into account overall greenhouse gas emissions and other potential environmental and economic impacts. The project will categorize additives for their potential usefulness in California and develop a research roadmap guiding future research in making this strategy applicable for the California livestock industry.

#### Objective

The overall objective of this study is to assess existing information on additive use as a strategy to reduce methane emissions from livestock operations and identify options that are effective, economically viable, and have no associated negative impacts for California's livestock industry.

#### Methods

This project will conduct literature review, database analysis, and life cycle assessment (LCA) to evaluate the potential and feasibility of using additives in feed and lagoons as a mitigation strategy to reduce methane emissions, and develop a research roadmap identifying data gaps and prioritizing future research efforts. The LCA takes into account overall GHG emissions, and other environmental and economic impacts associated with the additive use beyond methane emissions, and this project will classify the identified additives into different categories with regard to their potential applicability and benefits in California conditions.

**Expected Results**

The project will categorize additives for their potential usefulness in California and develop a research roadmap guiding future research in making this strategy applicable for California livestock industry.

**Significance to the Board**

The project will inform the potential strategies to reduce the largest source of methane emissions in the State and help California in meeting its broader climate goals.

**Contractor:**

University of California, Davis

**Contract Period:**

24 months

**Principal Investigator (PI):**

Ermias Kebreab, Ph.D.

**Contract Amount:**

\$114,995

**Basis for Indirect Cost Rate:**

The State and the UC system have agreed to a 25 percent indirect cost rate.

**Past Experience with this Principal Investigator:**

Dr. Ermias Kebreab, the Principal Investigator, is a lead expert nationally and internationally on enteric fermentation, and the PI for CARB's current project on developing California-specific enteric methane emissions models. Dr. Kebreab possesses a broad expertise and resources (including the relevant database) in quantifying greenhouse gas emissions from animals using a systematic approach. He is one of the key scientists in the Dairy Methane Workgroup and is able to coordinate and leverage research efforts in dairy research most effectively.

**Prior Research Division Funding to University of California, Davis:**

Year	2017	2016	2015
Funding	\$ 812,097	\$ 650,000	\$1,468,460

## BUDGET SUMMARY

Contractor: University of California, Davis

Strategies to Reduce Methane Emissions from Enteric and Lagoon Sources

### **DIRECT COSTS**

1.	Personnel (Salary and Fringe Benefits)	\$	91,996
2.	Travel	\$	0
3.	Materials & Supplies	\$	0
4.	Equipment	\$	0
5.	Electronic Data Processing	\$	0
6.	Consultant(s)	\$	0
7.	Subrecipient(s)	\$	0
8.	Other Direct Costs	\$	<u>0</u>

Total Direct Costs \$ 91,996

### **INDIRECT COSTS**

1.	Indirect (F&A) Costs	\$	<u>22,999</u>
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Total Indirect Costs \$ 22,999

### **TOTAL PROJECT COSTS**

**\$ 114,995**