By email to: cdfa.oefi_clim3ate_tech@cdfa.ca.gov

Date: November 14, 2022

Attn: CDFA Office of Environmental Farming

Re: Comments on draft Request for Proposals (RFP) for California Department of Food and Agriculture's (CDFA) 2022 California Livestock Methane Measurement, Mitigation and Thriving Environments Research Program (CLIM3ATE-RP)

Thank you for the opportunity to comment on the above-referenced draft RFP on behalf of Dairy Cares, a coalition of California's dairy producer and processor associations, including the state's largest producer trade associations (***California Dairy Campaign, California Farm Bureau Federation*** and ***Milk Producers Council***) and the largest milk-processing companies and cooperatives (***California Dairies, Inc., Dairy Farmers of America-Western Area Council, Hilmar Cheese Company, Joseph Gallo Farms, Land O' Lakes*** and ***Producers Bar 20 Dairy***). Formed in 2001, Dairy Cares promotes the long-term sustainability of California dairies by working together to address environmental and other sustainability issues.

Our coalition is grateful that the Legislature enacted, and Governor Newsom signed, the Budget Acts of 2021 and 2022 (SB 170, Chapter 240 and SB 154, Chapter 43, respectively), appropriating a total of $10 million from the California State Budget to CDFA for research grants to measure and verify emissions reductions associated with livestock methane reduction projects. CDFA's implementation of those statutes through the new CLIM3ATE-RP will help support, validate and even accelerate the already very successful implementation of CDFA's dairy methane-reducing programs. In addition to providing an opportunity to further innovate manure management practices, this new program will also support technologies that provide other environmental benefits, such as repurposing surplus dairy nutrients to innovative products, benefitting water quality, soil health, and reducing demand for conventional fertilizers. As always, we greatly appreciate CDFA partnership and support for a more resilient and sustainable California dairy industry.

In the interest of ensuring that CLIM3ATE-RP is administered successfully, we offer the following comments:

1. **Scoring criteria.** The scoring criteria (pps. 23-24) should be reweighted, adding more points to especially vital sections, to allow superior projects to better differentiate themselves. For example, only five points of 50 is allotted to project merit, leaving very little opportunity, points-wise, for a project with very large and multiple environmental benefits to distinguish itself from a project with only one or two modest benefits. Because of this, an application that is compiled in an excellent manner but describes a project with relatively modest environmental benefits might outscore an application for a project with significantly more environmental benefits. For this reason, we recommend adding 50 points to the scoring criteria, for a total of 100 points, with extra points added to four existing categories as follows:
    a. Add 15 points to "Project Description – Project Design, Work Plan Activities and Methods"
    b. Add 20 points to "Proposal Merit"
    c. Add 10 points to "Project Team – Contributions, Roles and Responsibilities"
    d. Add five points to "Work Plan"

2. **Clarify use of the term "proprietary."** Page 5 of the RFP states that "CLIM3ATE funds cannot be used for the development or testing of proprietary technologies and proprietary manure management strategies." This language would appear to prohibit use of the awards to test performance of proprietary technologies such as BioFiltro vermifiltration systems (which may be funded through AMMP), Sedron Varcor evaporative systems, Aquanos moving bed biofilm reactors (MBBR) and algae raceways, FYTO automated duckweed growing and harvesting systems, and potentially others. These are commercially available technologies that are patented and contain proprietary designs and components. We suggest that the RFP language be modified to make it clear that CLIM3ATE funds may be used to test these systems' performance after they have been installed permanently on dairies (or centralized sites serving dairies). One possible solution would be to reword the sentence on Page 5 as follows: "CLIM3ATE funds cannot be used for the development ~~or testing~~ of proprietary technologies and proprietary manure management strategies." Similarly, this section of the RFP contains a sentence that states: "Public sharing of project data and outcomes is required." It may be helpful to clarify that while research data and outcomes measuring environmental and/or economic performance must be disclosed, it will not be necessary to disclose trade secrets or proprietary information related to how the system is designed, manufactured and assembled.

3. **Clarify use of term "pre-commercial**." Page 8 of the RFP states that "Projects *can* [emphasis added] propose new and innovative, pre-commercial strategies or technologies with appropriate scientific evidence for applicability." This wording is somewhat vague; we interpret it as meaning "in addition to the funds being available for commercial technologies, with enough evidence provided, funds can also be used for innovative strategies that are not yet commercially available." However, it is possible a reader could interpret this sentence as "Projects can propose new and innovative pre-commercial technologies with appropriate scientific evidence for applicability, and that is all they can propose." We suggest clarifying this sentence to read: "In addition to proposing use or testing of commercially available methane measurement or mitigation strategies, projects may also propose new and

innovative, pre-commercial strategies or technologies with appropriate scientific evidence for applicability."

4. **Project timeline for Impact Area 3 should be extended.** CDFA sets a 32-month timeline for Impact Area 1 and 24-month timelines for Impact Areas 2 and 3. CDFA appropriately recognizes that for Area 1, it is necessary to allow additional time for measurements prior to construction of a methane mitigation project, then time to construct and begin operation of the project, and finally measure changes in emissions for a sufficient period following commencement of operation. Similarly, Area 3 requires constructing and operating a system to provide manure treatment, and potentially also producing innovative products resulting from the changed use of the manure stream. Therefore, time is needed to build and operate the system and to then evaluate the economic and environmental outcomes of the resulting products. For example, a system might take a year to construct, then some months to produce enough fertilizer product to be utilized in cropping, then additional months to test the product's performance in various crop trials. For this reason, we believe it would be prudent to set the Area 3 timeline to 32 months rather than 24, and to allow for extensions of that within the applicable limits of statutory authority.

5. **Application timeline and requirements.** The program implementation timeline (p. 6) is very ambitious, with applications potentially being due as early as before end of 2022 (the deadline used in the table is "TBD 2022/2023"). We believe the complexity of the Impact Areas will require teams to carefully deliberate and collaborate on project design as they prepare application packages. We believe a 60-day minimum application window is needed to ensure sufficient time for the collaboration needed for quality proposals to be developed. We also believe up to an additional 10 days should be added to the application window if both the Christmas and Thanksgiving holidays fall within the application period.

6. **Site commitment letter.** Attachment 5, Page 1 of the RFP says "If the project involves pilot testing, demonstration, or deployment activities, the applicant must include a site commitment letter signed by an authorized representative of the proposed test, demonstration, or deployment site that unconditionally commits to providing the site for the proposed activities." While we understand the need for such a commitment before a contract is awarded, it may be difficult to secure unconditional commitment letters during the actual application process, particularly when CDFA retains the right to award different amounts than requested, and when some projects may be relying on other grants or funding sources. We suggest this section be reworded to remove the word "unconditional."

7. **Clarity on target pollutants.** The statutory language cited on page 4 of the RFP says that "To the extent feasible, research shall include measurement of emissions of greenhouse gas and criteria pollutants before and after livestock methane reduction projects are implemented." Later, on page 9, it is also stated that "Applicants whose project[sic] aim to reduce methane or other criteria air pollutants must submit estimated emission reductions and quantification methodology used to calculate GHG emission reduction." We note here that methane is a greenhouse gas but not a criteria pollutant, and that criteria pollutants have

specific definitions in regulation.[1] We also note that the legislative intent language references "greenhouse gases" and not just methane. This is an important distinction because some changes in practices and technology reduce not just methane but other greenhouse gases such as nitrous oxide. Further, emissions like ammonia – neither a greenhouse gas nor a criteria pollutant – have been subject to much public discourse and great policy interest in recent years, and so we believe it is essential to measure changes in ammonia emissions resulting from installation of methane mitigation projects. Also, there are many criteria pollutants, but some of those – such as ozone – are not likely to be emitted at dairies and so there would be little value in trying to measure them. We suggest that CDFA include some language in the RFP to guide minimum expectations as to what specific air pollutants should be measured, such as methane, nitrous oxide, ammonia and particulate matter. Finally, we underscore the phrase "to the extent feasible" in the statutory language – there should be practical considerations to which pollutants are measured and how intensely they are measured.

8. **Reconsider Impact Area 1 research split between digesters and alternative manure management projects.** CDFA proposes to fund two projects under Area 1, at $1.25 million each; while not stated in the RFP, staff have commented that one of the two projects should focus on before and after emissions measurements involving digester projects, while the other should be focused on alternative manure management projects. We suggest that CDFA may want to reconsider this type of a split, either calling for measuring of both digester and AMMP sites in each of the two projects or allowing more of the funding to be used for AMMP measurement than for digesters. We cite the following reasons for this:

    a. Digesters in California are primarily covered lagoon digesters, of relatively similar design, and measuring ambient methane emissions around the project before and after the project is relatively straightforward. The difference in emissions before and after construction and operation is stark and immediate, much like turning off a light switch. There is almost a total reduction from the controlled source (the lagoon) and while there may continue to be some ambient methane near the source, it is likely this is from other sources on the dairy that weren't controlled, such as animals and manure storage outside the lagoon, and releases of digestate from the lagoon.

    b. In contrast, there is a much broader diversity of types of methane reduction projects in the AMMP category, both in design and performance. Thus, methane reductions from AMMP projects are extremely variable and exceptionally difficult to measure. In some cases, reductions may be relatively small and may develop gradually, less like turning off a light switch and more like a slower seasonal change. For example, mechanical separators divert volatile solids away from the lagoon, but the lagoon itself may continue producing methane at its "normal" pre-installation rate for a while, using up its already large stock of volatile solids – the "feedstock" for methane creation – still in the lagoon. Emissions reductions may not occur until the lagoon is starved of feedstock for a long enough period to use up reserves. Verifying the reductions may take extensive measurement over long periods of time to account for spatial and temporal variability. Emissions from open lagoons cover a large, open

[1] California Air Resources Board website, https://ww2.arb.ca.gov/our-work/programs/criteria-air-pollutants#:~:text=Criteria%20air%20pollutants%20are%20air,5. Accessed 11/12/2022.

area and lagoon emissions vary throughout the year due to many factors, including temperature, changes in loading rates (more manure may be flushed during the winter than during the summer when animals are more likely to be in corrals), and variations in inflows and outflows of water due to irrigation events. Successfully measuring before and after emissions under these circumstances is a heavy lift and likely will require significantly more resources than measuring emissions changes related to digesters. Similar difficulties would be associated with other AMMP practices that indirectly reduce emissions by diverting manure away from lagoons, such as partial conversion from flush to scrape with drying, and conversion of freestall barns to compost pack barns. With only $2.5 million available to study all these strategies, it may make sense for CDFA to avoid dividing that money evenly between digesters and AMMP projects, thus providing greater flexibility to final allocations.

9. **Minor comments.** On page 9, we suggest changing the word "reputed" to "reputable." On page 14, the term "current and pending support" is used, and the meaning is somewhat unclear; perhaps it could be reworded to increase clarity.

Conclusion. Once again, we thank CDFA for moving forward with implementation of this important program and for the opportunity to provide comments on behalf of Dairy Cares. We are happy to answer any questions or provide other assistance as needed toward ensuring the continued success of OEFI's many successful climate and environmental programs.

Sincerely,

Michael Boccadoro, Executive Director

J.P. Cativiela, Regulatory Director

C: Charles "Chuck" Ahlem, Chairman, Dairy Cares
Denise Mullinax, Executive Director, California Dairy Research Foundation

The following comments are submitted on behalf of Colin South, CEO of ArkeaBio. As requested, the comments are found in the body of the email along with subheading for funding track/impact area. Colin may be reached via email at csouth@arkeabio.com. Additional information about ArkeaBio may be found at www.arkeabio.com.

Thank you.

Comments

IMPACT AREA 2:
The grant description appears to promote technology to tackle a methane reduction, yet the details of the draft request for proposals (RFP) appear to exclude new technologies that can reduce methane emissions. Impact Area 2 includes alternative strategies to decrease or avoid enteric and/or manure methane emissions within its scope. Likewise, the "Project Technology and Feasibility" section states projects can propose new and innovative, pre-commercial strategies or technologies. However, the RFP also states that such technologies will need appropriate scientific evidence for applicability and grant funds cannot be used for the development or testing of proprietary technologies. Additionally, the scoring criteria appears to weight each evaluation factor equally which ultimately discourages new, emerging technology from the grant. These caveats may handicap projects based on new technology; thus, we encourage CDFA to define what new, innovative technology is eligible; reconsider the evaluation weighting, acknowledging new technology may have limited scientific studies, and remove any overly strict restrictions that would prematurely limit new approaches for reducing enteric and manure methane emissions. Moreover, after the U.S. Department of Agriculture awarded $2.8 billion under its climate-smart commodities grant to awardees using existing technologies, Arkea Bio believes it is even more important now than ever that CFDA seeks out new approaches to combating methane.

IMPACT AREA 2:
We appreciate CDFA including examples of alternative strategies to decrease or avoid enteric and/or manure methane. However, it is unclear if this is an exhaustive list or not. Will the grant be limited to the specific technologies listed in Impact Area 2? If so, we suggest that approaches which impact the microbiome of the cow's rumen also be included as eligible strategies. Specific populations within the microbiome are significant sources of enteric methane. Technologies that are neither genetic- or diet-based, but which modify the microbiome, may provide significant methane reduction; thus, they should be considered.

GENERAL INSTRUCTIONS:
Please provide clarification on the following items related to the grant's draft RFP instructions.

1. May applicants submit Letters of Support? If so, please provide instructions in the final RFP on how to do so.

2. The Project Summary Template requires the project's summary to include unique aspects of its methods or team that will contribute to the success of the proposed work. Please provide further details on what information should be included and would to CDFA in making that determination. Instructions and examples would be appreciated.
3. The Project Description Template requires applicants to provide examples of project barriers. Can CDFA provide an example of project barriers for the purpose of the Project Description Template?
4. Please define and provide examples to better convey how CDFA will determine:
    a. an applicant's "ability to complete the project", and
    b. environmental co-benefits.
5. The draft RFP states that the CDFA staff will ensure the final report of the project's results will be disseminated to the public. Does the CDFA anticipate including any exceptions to publication or redactions for confidential information from new technologies?

Sustainable Conservation

November 14, 2022

Office of Environmental Farming and Innovation
California Department of Food and Agriculture
1220 N Street
Sacramento, CA 95814

To Whom it May Concern,

Sustainable Conservation commends the Department of Food and Agriculture on the forthcoming implementation of the 2022 California Livestock Methane Measurement, Mitigation and Thriving Environments (CLIM3ATE) Research Program. The funding dedicated to advance research projects designed to address methane emissions carries forward the promise of reducing these emissions to 40% of 2013 levels by 2030 as mandated by SB 1383. As such, we support the CLIM3ATE Program as a key component of California's overall strategy to combat climate change.

Of special importance in the draft CLIM3ATE RP Request for Proposals (RFP) is the funding allocated in Impact Area 3, which will award grants to projects that integrate methane reduction and manure management strategies, advance efforts to address manure recycling, and contribute to the development of innovative products. Sustainable Conservation has been a participant in the Manure Recycling and Innovative Products (MRIP) Task Force, convened by the California Department of Food and Agriculture to develop recommendations on how to capture and enhance the value of dairy manure to support healthy soils, protect water quality, and reduce agriculture's carbon footprint in California. As such, we appreciate the inclusion of Impact Area 3 in the RFP and the recognition of the role that manure management will play in meeting SB 1383 goals.

In the existing guidelines for which projects may be eligible for funding in Impact Area 3, Sustainable Conservation notes the inclusive language that will hopefully allow for a wide range of funding applications to be submitted. However, we recommend refining the language on Page 4 of the RFP to provide more specified guidance to applicants seeking funding for manure management projects. While we do not interpret the current language to exclude any beneficial projects, we believe it would be helpful to the research community to have more certainty about allowable projects.

We recommend specifically including the following categories of eligible projects into the language detailing qualifications for Impact Area 3:

1. Projects promoting the increased use of conventional strategies. There have already been many positive strides made in manure management to reduce methane emissions. These include strategies to better utilize liquid manure on farms or diverting manure away from liquid storage to dry storage. While these are established practices in many respects, there is still work to be done in increasing adoption and implementation of these measures.

Sustainable Conservation

2. Projects that increase knowledge regarding compost strategies. Composting processes are relatively well understood and to some degree already employed among dairy producers. However, the impact of new landfill diversion requirements, gaps in research on environmental and food safety issues, and uncertainty and lack of awareness about existing air quality regulations and permitting requirements has created barriers to increasing production of dairy manure compost.

3. Projects that advance denitrification and treatment technologies. Denitrification represents some of the more advanced manure management strategies potentially available, removing nitrogen entirely or converting it into stable nitrogen (N2) gas through a variety of manure treatment processes. We recommend the RFP specifically allow projects that study economic and environmental outcomes for these types of technologies – including vermifiltration, algae raceways, and other promising technologies identified by MRIP.

4. Projects that advance nitrogen capture technology. Nitrogen capture systems represent a particularly innovative type of dairy manure management. Prior evaluation efforts have focused primarily on two technologies; evaporative liquid waste processing systems, and polymer flocculant-based solids/liquid separation systems. Evaporative technology processes dairy manure into solid and liquid nutrient products for sale as organic fertilizers or replacements for conventional liquid and solid fertilizer products. Polymer flocculant-based solids/liquid separation systems extract nutrients in the form of a sludge, which can be used much like raw manure. Evaporative systems in particular appear to provide environmental benefits and pathogen-free solid and liquid fractions, which may be readily marketed as organic fertilizers or alternatives to conventional fertilizers.

We also recommend clarifying whether equipment, supplies, and other costs must be specific to emissions research, or whether those types of costs are also allowable for (1) implementation of practices/technologies, and/or (1) activities to "address market barriers or knowledge gaps for pre-market or emerging market materials or strategies, including product safety, adoption, efficacy, and cost-effectiveness."

With the inclusion of these more specific eligibility guidelines, we believe that the applications received for Impact Area 3 will be stronger and better focused on highest priority needs, as identified by the MRIP. As such, funding allocated under the CLIM3ATE Research Program will achieve the maximum benefits possible in advancing new manure management practices and technologies, a vital component of any effort to reduce methane emissions.

Sustainable Conservation

Thank you for the opportunity to comment on this valuable program, and for your efforts in realizing the goals set in SB 1383. If you have any questions about our feedback, please feel free to contact me at 916.469.5159, or cdelgado@suscon.org.

Sincerely,

Charles R. Delgado
Policy Director

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November 14, 2022

ATTN: CDFA Office of Environmental Farming
cdfa.oefi_clim3ate_tech@cdfa.ca.gov

Re: Comments on the draft RFP for CDFA's 2022 California Livestock Methane Measurement, Mitigation and Thriving Environments Research Program (CLIM^{3}ATE-RP)

To Whom It May Concern,

The California Dairy Research Foundation (CDRF) appreciates the opportunity to submit this comment letter regarding the new CDFA draft RFP titled: **"2022 California Livestock Methane Measurement, Mitigation and Thriving Environments Research Program (CLIM^{3}ATE-RP)."** CDRF was created as a not-for-profit research management corporation in 1988 for the purpose of managing, coordinating, and communicating research and science-based education programs that support an innovative and sustainable California dairy industry. We focus primarily on research that is essential to the sustainability of California's dairy industry, especially collaborative research that can impact environmental sustainability. Therefore, CDRF and the larger California dairy industry are very interested in projects such as this that are geared towards efforts to address our shared sustainability goals. This RFP appears timely for the industry as it provides greater opportunity to address important barriers to our state's climate goals.

As a research organization, we offer two suggestions for improving the RFP that we believe will help ensure that the best projects are selected for the awards, and that these projects are setup to succeed for the benefit of the state of California, its dairy producers, and our environment.

1. **Funding and Duration (Pages 4-5):** We suggest that the CLIM^{3}ATE-RP project timelines for the Impact Areas 2 and 3 be extended. Our experience as a research organization has shown that impactful research such as that requested takes time. Specifically, we suggest that timelines for the Impact Areas 2 and 3 be extended from 24 months to 32 months, so they are similar to that of Impact Area 1. Many of these types of projects are not likely to complete the appropriate setup and hiring, get baseline measurements, then go through installation of new technologies, troubleshooting, data collection, analysis, and write-up, in a time frame of 24 months. If the ability exists to extend the funding for these timelines to 32 months, we think that will likely improve the quality of projects that applicants submit, and at the same time potentially help CDFA avoid the need to grant no-cost extensions or deal with projects that are not able to be completed by the drop-dead date.

2. **Appendix D: Detailed Scoring Criteria (Pages 23-24):** We also suggest that the Scoring Criteria be re-evaluated to consider weighting the different scoring categories more appropriately to capture their respective value to overall project success and potential environmental benefits. We think that providing a higher number of Max Points to certain scoring categories will help CDFA better identify better investment opportunities through projects with higher potential impact. As the Scoring Criteria currently stands, the value of a well-written "Project Summary" is equal to value of the "Proposal Merit." However, these two criteria are not nearly of equal value to the success of the project or the impact it could have on the industry and environment. In our opinion, criteria such as the 'merit' of the proposal and its ability to scientifically or technologically advance the industry should be valued much higher than whether the applicant can produce a well-written summary of the project.

Therefore, we suggest that the overall Scoring Criteria for the RFP be increased from 50 to 100pts to allow for better weighting and ranking of the most important elements of the RFP. We suggest that the scoring categories of "Project Design and Work Plan," "Proposal Merit," "Project Team," and "Work Plan" are all of higher value to the project's overall success than the other criteria and should be awarded higher Max Points. In order to cover the difference to meet a 100-point Scoring Criteria, we suggest point additions are as follows:

- Project Design, Work Plan Activities and Methods: **20 points**
- Proposal Merit: **25 points**
- Project Team: **15 points**
- Work Plan: **10 points**

Suggested New Scoring Criteria below:

Appendix D: Detailed Scoring Criteria

SCORING CRITERIA	MAX POINTS
Project Summary	**5**
The project summary addresses each section of the provided template, and the solution or opportunity are clear and impactful, and strongly aligned with the impact areas.	
Project Description – Impact and Objectives	**5**
Are the objectives appropriate and adequate to address the problem or opportunity posed by the project?	
Project Description – Background	**5**
How comprehensive is the assessment of relevant technical, scientific, and development work completed in the topic area? Does the project appropriately build on previous work completed in the topic area, and ensure consideration of lessons or shortfalls of similar or prior work?	
Project Description – Project Design, Work Plan Activities and Methods	**20**
How clear, coherent, and well-described are the project components (experimental design, methodology, implementation plan etc.)? Does the project contain technical and scientific merit? Is the measurement of greenhouse gasses and comparison to existing models clear and appropriate?	
Proposal Merit	**25**
How significantly will the anticipated results of this project contribute to the program track identified and the overall scientific or technological advancement of California's dairy and livestock operations?	
Ability to Complete	**5**

Will the team have the technical resources, facilities, freedom to operate, and access to required data or IP to successfully complete this project? Do any project-related risks pose a threat to the successful completion of the project, and have any project barriers been identified and addressed? Has this applicant received a CDFA Award previously? Was the previously funded work successfully executed?	
Budget and Justification	**5**
Is the proposed budget appropriate to support the achievement of the objectives and outcomes identified in the proposal? Is the proposed budget under or overestimated?	
Project Team – Contributions, Roles and Responsibilities	**15**
Does the identified team have the expertise, team lead, and required skill sets to successfully achieve all the project outcomes? Have the roles and responsibilities of each team member been clearly detailed?	
Work Plan	**10**
Is the Work Plan robust? Are the deliverables relevant and achievable? Do the activities identified clearly support the overall objectives of the project?	
Socially Disadvantaged Farmers and Ranchers	**5**
Is the applicant a Farmer and/or rancher who identifies as belonging to a socially disadvantaged group, or does the project involve or take place in collaboration with a farm or ranch operated by Socially Disadvantaged Farmers or Ranchers?	
TOTAL	**100**

Again, we appreciate the opportunity to provide comments on the draft RFP. This important research to measure and verify emissions reductions associated with livestock methane reduction projects will support CDFA's successful implementation of its dairy methane mitigation programs and ultimately the dairy industry. Please do not hesitate to contact us if we can answer any questions or be of assistance as you look to continue to implement OEFI's already very successful climate programs.

Sincerely,

Denise Mullinax
Executive Director, CDRF
Assistant Director, CDQAP
(209) 585-6744 / mullinax@cdrf.org

C: Joshua Zonneveld, Chairman, California Dairy Research Foundation

November 14, 2022

Secretary of Agriculture Karen Ross
California Department of Food and Agriculture,
Office of Environmental Farming and Innovation
1220 N Street
Sacramento, CA 95814

Per Email: CDFA.OEFI_CLIM3ATE_TECH@CDFA.CA.GOV

Secretary Ross:

Thank you for the opportunity to comment on the draft RFP for the CLIM3ATE program, which will allocate funds for agricultural methane reduction research. We are gratified to see $10 million directed toward overcoming the barriers to methane reduction from dairy and livestock sources. In this letter we suggest some additions to the descriptions of Impact Areas 1 and 2, and provide background below.

We suggest adding the following to the description of desired projects for Impact Area 1:

> *For biodigesters:* Priority will be given to projects that a) evaluate the cost-effectiveness of fuel cells and other means of reducing digester-produced air pollution and/or b) show how methane reductions from digesters fit into the overall emissions/air pollution profile of the farms.
>
> *For AMMP:* Priority will be given to studies of vermifiltration.

We suggest this addition to the Impact Area 2 description (page 3):

> Priority will be given to studies of manure acidification.

Background:

IMPACT AREA 1

Although the draft RFP correctly prioritizes cost effectiveness, it does not appear to prioritize projects in advance based on information that is readily available in published research and reports on the project impact areas.

As we read the literature, for *biodigesters* the two highest priorities in such an analysis are a) determining the cost effectiveness of fuel cells or other means of reducing digester-produced air pollution and b) determining how methane reductions from digesters fit into the greenhouse gas/air pollution profile of farms—thus testing the assumptions and models built into CARB's tool used by the dairy digester grant program (DDRDP) to select applicants, and indirectly by the LCFS program to assign value to the amount of fugitive methane avoided.[1]

[1] Quantification Methodology, California Department of Food and Agriculture Dairy Digester Research and Development Program, California Climate Investments. February 3, 2020.

With regard to fuel cells: Environmental justice concerns about dairy digesters focus on air pollution, both because digesters sustain CAFOs (or even incentivize larger herds) and because they produce emissions that are a threat to human health. The recent CARB final report on methane reduction by 2030 suggests fuel cells as an alternative to combustion of biogas to produce electricity. While it is clear that fuel cells will cost more than continuing to burn biogas in internal combustion engines, it is not at all clear to what extent the payoff will justify the expense.[2] There is at least one farm, which has installed fuel cell technology, that could be part of a study. The fuel cell option is being offered to environmental justice groups as an alternative to more polluting power sources, but we need to know if the benefits will balance the higher costs or if the costs are even feasible. Consideration should be give not only to fuel cells but to other means of reducing air pollution created by generation of electricity through burning biogas —for example, microturbines.[3]

The major reason for an on-the-ground study(s) of overall farm-gas ecology, including greenhouse gas emissions and other air and water pollutants, is to assess the CARB quantification methodology. At this point hundreds of millions of dollars have been spent on digesters or, through the LCFS program, paying for gas and electricity created by digesters not only in California but across the country. Models, including validation of emissions factors, are hard to make accurate in agriculture because of the multiple variables involved, their variation by season, and their interaction. There are methodologically sound empirical studies that bring into questions many of the modeling assumptions and predictors used by the federal EPA, the IPCC and CARB.[4] Top-down and ground-up measurements also differ.[5] Actual before and after measurements of the whole farm emission/air pollution profile will provide evidence whether the CARB quantification method is accurate and is being applied accurately by applicants to the DDRDP.

With respect to how digesters fit into dairies' overall ecology and carbon footprint and the validation of the CARB methodology, the literature includes a study of two farms with biodigesters that, after five years, had the same overall GHG emissions as before installation of the digesters.[6] Another study has documented that the Low Carbon Fuel Standards program incentives may increase herd sizes due to much higher profits for larger herds— a feedback loop which means more enteric methane.[7] Additionally, the treatment of the digestate needs to be better understood.[8] Seasonality greatly affects

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https://ww2.arb.ca.gov/sites/default/files/auction-proceeds/cdfa_ddrdp_finalqm_2-3-20.pdf Versions of this tool date back to 2011.

[2] The CARB final report: https://ww2.arb.ca.gov/sites/default/files/2022-03/final-dairy-livestock-SB1383-analysis.pdf contains a cost-benefit calculation, but it omits the crucial variables of pollution from internal combustion engines and does not use an up-to-date method of calculating the social cost of carbon. See Brian C. Prest et al., "Updated Estimates of the Social Cost of Methane for Usage in Regulatory Analysis., (2022).

[3] http://content.stockpr.com/capstoneturbine/db/185/670/pdf/CS_CAP382_den+Dulk+Dairy_lowres.pdf

[4] Frank Mitloehner, et al, 'Benchmarking of pre-AMMP dairy emissions: Final Report to the California Department of Food and Agriculture," August 30, 2019. Grant Number: #16-0747-SA; Alison R Marklein et al., "Facility-scale inventory of dairy methane emissions in California: implications for mitigation," *Earth System Science Data* 13, no. 3 (2021): 1151-1166.

[5] Saijan Heerah et al, "Dairy Methane Emissions in California's San Joaquin Valley Inferred With Ground-Based Remote Sensing Observations in the Summer and Winter," *Journal of Geophysical Research: Atmospheres* 126, no. 24 (2021): e2021JD034785.

[6] Z. Debruyn, A. VanderZaag, and C. Wagner-Riddle, "Increased dairy farm methane concentrations linked to anaerobic digester in a five-year study." *J. Environ. Qual.* 2020; 49: 509– 515.

[7] https://climatetrace.org/map/north-america-manure-management-co2e20 A. Younes and K. Fingerman, K.(2021).Quantification of DairyFarm Subsidies Under California's Low Carbon Fuel Standard.Arcata, CA. Study conducted for the Union of Concerned Scientists.

[8] K. Aikaterini et al., "Influence of different practices on biogas sustainability," *Biomass and Bioenergy*, Volume 53, 2013, Pages 149-161, ISSN 0961-9534, https://doi.org/10.1016/j.biombioe.2013.02.020 . https://www.sciencedirect.com/science/article/pii/S0961953413000940

methane formation and emission. The amount of methane (and other greenhouse gases) produced from manure is not a fixed feature of the natural world. "Depending on the practice and farm size, GHG emissions per ton of manure range from 2200 to 12,000 g CO2-eq for collection, 200 to 2400 g CO2-eq for transportation, 16,000 to 84,000 g CO2-eq for storage, and 16,400 to 33,500 g CO2-eq for land-application."[9] All these factors—what we consider to be greenhouse gas ecology—need to be fully examined in projects like those the CLIM3ATE program should fund, in order for the LCFS to get right the carbon intensity of dairy digesters; getting it wrong will lead to overpaying and less effective methane reduction.

Methane leaks are also an issue greenhouse gas ecology studies should address—both on the farm and in pipelines transporting biomethane. Just as any advantage of natural gas over coal disappears with leak rates of 2% or more, leak rates of 5%[10] or more will nullify the LCFS credits given electricity or biomethane for reduced transportation emissions. Measurement needs to encompass the digester emissions (and avoided emissions), digestate emissions, and the whole farm emissions, including enteric, and a description of herd size and other manure management practices.

With respect to AMMP, there are many procedures that have been shown to have some capacity to reduce GHG emissions.[11] However, there is only one that has the potential to equal or come close to what digesters have the potential to achieve: vermifiltration. At least two studies show reductions in methane in the 90% plus range[12] and AMMP recently funded its first vermifiltration project. Multiple other benefits also accrue to the use of vermifiltration.[13] Since this procedure has by far the greatest capacity for GHG emissions reductions and other benefits important to Central Valley farms, it is critical that the program you funded be studied.

IMPACT AREA 2: Manure Acidification

Based on the literature, the only "new" AMMP procedure that shows significant promise is acidification.[14] Unfortunately, research at scale (in the USA at least) has not yet been published. While it

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[9] Horacio A. Aguirre-Villegas, Rebecca A. Larson, Evaluating greenhouse gas emissions from dairy manure management practices using survey data and lifecycle tools, Journal of Cleaner Production, Volume 143, 2017, Pages 169-179, ISSN 0959-6526, https://doi.org/10.1016/j.jclepro.2016.12.133.(https://www.sciencedirect.com/science/article/pii/S0959652616321953)

[10] Tine LI Vergote et al., "Model-based analysis of greenhouse gas emission reduction potential through farm-scale digestion." *Biosystems Engineering* 181 (2019): 157-172.

[11] Horacio A. Aguirre-Villegas, and Rebecca A. Larson, "Evaluating greenhouse gas emissions from dairy manure management practices using survey data and lifecycle tools, "*Journal of Cleaner Production*, Volume 143, 2017, Pages 169-179, ISSN 0959-6526, https://doi.org/10.1016/j.jclepro.2016.12.133.(https://www.sciencedirect.com/science/article/pii/S0959652616321953)

[12] Sabina Dore, Steven J. Deverel, and Nicholas Christen. "A vermifiltration system for low methane emissions and high nutrient removal at a California dairy." *Bioresource Technology Reports* 18 (2022): 101044. https://www.sciencedirect.com/science/article/pii/S2589014X22001013

[13] https://meansandmatters.bankofthewest.com/article/financial-perspectives/industries/innovative-washington-dairy-aims-to-go-carbon-negative/

[14] See: Mohd Saufi et al., "Reduction of methane emission during slurry storage by the addition of effective microorganisms and excessive carbon source from brewing sugar," *Journal of Environmental Quality* 45, no. 6 (2016): 2016-2022; and Vera Sokolov et al., "Greenhouse gas mitigation through dairy manure acidification," *Journal of Environmental Quality*48, no. 5 (2019): 1435-1443; Joana Prado et al., "Bio-acidification and enhanced crusting as an alternative to sulphuric acid addition to slurry to mitigate ammonia and greenhouse gases emissions during short term storage." *Journal of Cleaner Production* 263 (2020): 121443; NS Sorenson, op cit.; Søren O.

needs study, acidification may best be tested on the 40% of California dairy farms that do not use manure lagoons, since it is unclear that acidification would work as well with diluted manure, compared with the slurry that is treated (primarily for ammonia) in Europe. In experiments, reduction of methane by 80% is common. This is a sufficiently favorable outcome to be worth prioritizing for study.

Thank you again for the opportunity to comment on this important project.

Sincerely,

Daniel Chandler, Ph.D
Steering Committee
350 Humboldt

Janet Cox
Acting Chair
Climate Action California

Will Brieger
President
350 Sacramento

Jan Dietrick
Ventura County Climate Hub

Petersen et al., "Methanogenic community changes, and emissions of methane and other gases, during storage of acidified and untreated pig slurry." *Journal of applied microbiology* 117, no. 1 (2014): 160-172; and Carlyn Peterson et al.,"Effects of SOP lagoon additive on gaseous emissions from stored liquid dairy manure." *Sustainability* 12, no. 4 (2020): 1393. The roughly 20% reduction in methane was also found in a European test. See also Federica Borgonovo et al., "Improving the sustainability of dairy slurry by a commercial additive treatment." *Sustainability* 11, no. 18 (2019): 4998; and Vera Sokolov et al.,"Response Curves for Ammonia and Methane Emissions from Stored Liquid Manure Receiving Low Rates of Sulfuric Acid." *Frontiers in Sustainable Food Systems* 5 (2021): 224; and Søren O. Petersen, "Greenhouse gas emissions from liquid dairy manure: Prediction and mitigation." *Journal of dairy science* 101, no. 7 (2018): 6642-6654.
https://www.researchgate.net/publication/320044299_Greenhouse_gas_emissions_from_liquid_dairy_manure_Prediction_and_mitigation

Hello, CDFA.

We appreciate the opportunity to ask few general questions about the solicitation for research projects that address key barriers to achieving California's climate goals. Thank you for your attention.

1. Under Funding and Duration (p 4 of 26), the Budget Act of 2021 and 2022 is quoted: "To the extent feasible, research shall include measurement of emissions ... before and after livestock methane reduction projects are implemented."

Multiple available technologies exist to accomplish the measurement of both manure management emissions and enteric emissions; no? We are operating under the assumption that CDFA will favor projects that use these technologies to diligently measure before and after methane emission mitigation strategies over those that claim that accurate measurement is not feasible. Please let us know if that is not the case.

2. Eligibility (p. 5 of 16). Will CDFA accept more than one proposal from a California-based private company for a single Impact Area? And/or may a California-based private company serve as Contractor to more than one California-based University research institution or non-profit organizations? Are California-based University research institutions limited to the UC and Cal State systems?

3. Further regarding Eligibility and Exclusions, and following up on a question in the webinar from JP Cativiela, I believe, we understand that all project data and outcomes must be shared. Publishing (i e., peer review) research from commercial dairy trials has proven challenging, given the understandable difficulties on a working farm to maintain strict control and occasional inattention to protocols by farm labor. We'd like to share both methods, data and outcomes; would the CDFA website be a potential site for such public sharing, or is there another open repository we might consider?

Thank you.

Best regards,
Joan

CalCAN
CALIFORNIA CLIMATE & AGRICULTURE NETWORK

Sustainable Conservation

CLIM3ATE Program
Office of Environmental Farming & Innovation
California Department of Food and Agriculture
1220 N Street
Sacramento, CA 95814

November 14, 2022

To Whom it May Concern,

We are very pleased to see the Department's efforts to advance research on livestock methane measurement and mitigation with this draft RFP. It is our hope that these research grants will provide a more complete picture of the current state of dairy and livestock practices that reduce methane emissions. Understanding how those practices may be scaled up is critical to advancing climate strategies in the dairy and livestock sector and such knowledge can inform the state's efforts to effectively meet its SB 1383 goal while providing co-benefits for water quality, air quality, and public health.

In particular, we support the focus on assessing the cost-effectiveness of various strategies, and are pleased to see that the scope of projects in Impact Area 1 includes measurements of not only methane but also criteria air pollutants and impacts on water, air quality and priority populations.

We support the relative distribution of funding across the three Impact Areas. We also support the inclusion of additional points in the grading criteria for projects involving Socially Disadvantaged Farmers or Ranchers. To further strengthen the draft RFP and the resultant research outcomes, we offer the following recommendations.

First, we urge CDFA to keep the grant application open for a minimum of 90 days. Currently the draft RFP lists the grant application due date as "TBD 2022/2023". We are concerned that a 2022 deadline to submit grant applications will not allow sufficient time for applicants to compile the required materials. By providing only a short application window that may coincide with winter holidays and the end of the academic term, CDFA risks having a small pool of applicants for these competitive grants. A 90-day window for applications will make it more likely that a broader set of researchers will be able to submit applications.

For Impact Area 1, it is unclear if the intent is to require proposals that evaluate one or both of the two dairy methane programs. We recommend that separate grants are awarded for evaluation of methane reductions under Alternative Manure Management Program (AMMP) and Dairy Digester Research & Development Program (DDRDP) projects, ensuring that a minimum of one grant is awarded per program. The two programs operate in different contexts, utilize distinctly different technologies, and likely have very different research parameters that will require researchers to tailor the study design and measurement protocols to each program. We strongly recommend that the RFP clearly state that Impact Area 1 projects should analyze data from the several years of funded digester and AMMP projects. We understand that some data collection has already taken place under the auspices of either program, and those data should be made available to successful applicants to incorporate into their analyses. We are encouraged to see that project designs and measurement timelines must account for factors such as seasonal variation, operation specific practices, infrastructure design and operation and measurement of factors that may influence variation in emissions measurements.

CDFA should broaden evaluation criteria for Impact Area 2 to include economic analysis, environmental impact analysis, and measurement of non-methane impacts. California's approach to greenhouse gas reductions has historically been explicit about seeking multiple co-benefits, so this expanded criteria is important. Applicants should be encouraged to conduct a life cycle analysis of potential new technologies and products to guard against unintended consequences and to evaluate co-benefits. Additionally, while the RFP mentions feed additive safety, the department may also wish to consider adding nutritional impacts to the evaluation criteria and an analysis of impacts across different breeds.

On page 8 the RFP document outlines standards for data collection on GHG emission data. We recommend comparable standards for measurement of other criteria air pollutants and water quality.

Thank you for the opportunity to comment and for your consideration of this input.

Sincerely,

Sandra Nakagawa
Policy Director
California Climate and Agriculture Network (CalCAN)

Charles Delgado
Policy Director
Sustainable Conservation