

**From:** [jlee@everyactioncustom.com](mailto:jlee@everyactioncustom.com) on behalf of [Joanna Lee](#)  
**To:** [CDFA OEFI@CDFA](mailto:CDFA_OEFI@CDFA)  
**Subject:** Don't fund dairy digesters!  
**Date:** Friday, October 11, 2019 4:44:20 PM

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Dear CDFA Comments,

I am deeply troubled by the attempts to use California Department of Food and Agriculture funds to build more dairy digesters on factory farms. Dairy digesters contribute to air pollution and do nothing to address the massive water contamination and other environmental impacts of these massive dairy operations.

Please stop supporting this false solution. I urge you to use these funds to support AMMP projects that support dairy farmers that are using manure management techniques that result in clean air and water.

Sincerely,  
Joanna Lee  
1847 Massachusetts Ave SE Washington, DC 20003-2529

NOTE: CDFA received 1,126 additional similar emails during the public comment period. Emails available upon request. Please send an email to [cdfa.oefi\\_ddrdp\\_tech@cdfa.ca.gov](mailto:cdfa.oefi_ddrdp_tech@cdfa.ca.gov) for access.



October 14, 2019

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

**RE: AMMP Program Comments**

Dear Dr. Joshi,

Thank you for the opportunity to provide comments on the Alternative Manure Management Practices (AMMP) program.

We appreciate the improvements CDFA has made to AMMP in recent years, including moving from quarterly reports to annual reports, maintaining project funding at 100 percent, and funding AMMP Demonstration projects.

AMMP has proven to be a very popular program with more dairy and livestock producers applying in 2019 than ever before. The program allows producers to upgrade their operations and not only address methane emission issues but also other air and water quality concerns, providing multiple benefits to their communities. Given the success and demands for the program, we urge CDFA to improve AMMP's funding allocation. We discuss this further below, along with our other recommendations to improve program impact and accessibility to dairy and livestock producers throughout the state.

Thank you for your consideration. We look forward to discussing this further with you.

Sincerely,

Jeanne Merrill, Policy Director, California Climate & Agriculture Network

Jeff Creque, Director of Rangeland and Agroecosystem Management, Carbon Cycle Institute

Rebecca Spector, West Coast Director, Center for Food Safety

David Runsten, Policy Director, Community Alliance with Family Farmers

William Hart, Program Manager, Gold Ridge Resource Conservation District

Jill Demers, Executive Director, Humboldt County Resource Conservation District

Jo Ann Baumgartner, Director, Wild Farm Alliance

## **Comments:**

**1. New Practices Review Process in 2020.** We recommend that CDFA host a new practice review process for AMMP in 2020. By focusing on new practices outside of the busy schedule to complete the guidelines for the program, there will be more time for CDFA and stakeholders to solicit input from the research community on the latest science to inform potential new AMMP practices, including expanding the scope of AMMP to address nitrous oxide emissions and nutrient management overall. We have not seen a list of new practices that CDFA is considering for the program but only very general suggestions on expanding the program scope to include nitrous oxide emissions and improved nutrient management. We cannot adequately respond to this request without better understanding the practices under consideration and the related science. A new practice review process would also allow for additional practices to be suggested and reviewed. We recommend that a public meeting of the AMMP technical review committee be a part of this process to increase transparency of the program.

**2. Prescribed Grazing as part of AMMP.** CDFA suggested at the listening sessions that it was considering addressing nitrous oxide emissions and nutrient management concerns through AMMP incentives and demonstration projects. While we support CDFA's efforts to be more holistic by considering the full greenhouse gas emissions and water and air quality impacts of dairies and livestock operations, it is important to look at the full carbon footprint of operations and include opportunities for improved carbon sequestration as co-benefit to the program. For example, prescribed grazing can reduce methane emissions and increase carbon sequestration but producers must apply to a separate program, Healthy Soils, to receive CDFA funding for this practice. Such a requirement is impractical as few producers have the time and resources to do more than the complex AMMP application. CDFA must begin to break down the silos across programs and look for opportunities to streamline and ease the application burden on producers. One step toward eliminating program silos is to include prescribed grazing as part of the AMMP list of eligible practices. We welcome this discussion as part of a new practice review process, as described above.

**3. Allow for 25% Advance Payment.** We strongly recommend that CDFA allow for 25 percent advance payment for AMMP projects, similar to what the Department of Conservation has done for the Sustainable Agricultural Lands Conservation Program (SALCP) and other Climate Change Investment (CCI) agencies have done with their programs. As the dairy industry is still coming out of the most recent dairy price crisis, cash flow is of huge concern. By allowing

for an advance payment option under AMMP, a more diverse set of producers could participate in the program, thus improving program impact.

**4. Adopt a Pre-proposal Process.** Other CCI programs have moved to a pre-proposal phase that allows the agency to work with the applicants on their proposals and improve the success rate of full proposals. Among those now requiring pre-proposals is the Department of Conservation for Sustainable Agricultural Lands Conservation Program (SALCP) applicants. SALCP applications are no more complex or time intensive than AMMP projects. We see no reason why AMMP cannot similarly move to a pre-proposal application process. Under SALCP this allows the land trust applicants to avoid the expense of land appraisals if their projects are not accepted for a full proposal. Similarly, dairy producers could avoid the full expense of project design and engineering of their projects during the pre-proposal phase. This is cost prohibitive for many producers.

CDFA could consider a two-stage proposal process that lessens the burden on producers by requiring a pre-proposal containing sufficient information for CDFA to approve projects pending the submission of more detailed plans and budgets during a final project review and contract completion. This would likely result in greater demand for the program, fewer incomplete applications, lower risk for the producer, and more consistency between proposals and project implementation – improving project outcomes for the state.

**5. Shorten Application Period to Address Rising Costs.** Given our current economic environment, including rising tariffs, AMMP applicants are finding between the time they get their project construction bids (this year in the spring), and the time they found out if they awarded, 4 months later, those bids are no longer valid. We believe a pre-proposal process could shorten the timeframe from bid development to green lighting projects. But even if CDFA does not pursue a pre-proposal process, as described above, ideally the state can shorten the time from application to award to just three months to avoid rising project costs.

**6. Ensure Year-Round, Continuous Technical Assistance for Improved Program Impact.** Under the newly established Technical Assistance Program (TAP) at CDFA, technical assistance providers, such as Cooperative Extension, Resource Conservation Districts and nonprofits, can apply to CDFA to work with producers on their AMMP and Healthy Soils projects. We were very glad to see this technical assistance program expanded to include outreach, project development, grant application assistance and project implementation. However, under the current TAP guidelines, TA providers can only work with 2019-20 applicants and awardees and not those who were funded in prior years or those considering applying later. This is a significant constraint, which will impact the effective delivery of technical assistance. AMMP projects are complex and those funded in prior years may still be working through project implementation and would be served well by ongoing assistance from TA providers. Similarly, not all producers will be ready to apply to AMMP in January 2020 but may begin to consider projects later in the year for a future application period. They would benefit from TA provider input. We urge CDFA to allow for consistent, year-round TA under the program that is not limited to the 2019-20 applicants and awardees, as intended by AB 2377.

**7. Increase AMMP Funding, Allocate 50 percent of FY 2019-20 Funds.** We understand from CDFA staff that how the department determines the division of funds among the two dairy

methane programs, AMMP and the Dairy Digester Research & Development Program (DDRDP), is based on program impact. CDFA argues that digesters have a greater benefit than AMMP projects because digesters achieve a greater methane reduction. We would argue that this analysis is based on some problematic assumptions, including the longevity of the digester technology.

As CDFA considers how to divide the \$34 million in available funding for dairy methane projects in FY 2019-20, we urge the department to re-consider the current measure of impact across the programs. For example, CDFA calculates the GHG emission reduction impacts from AMMP projects on a 5-year project basis whereas the DDRDP projects are calculated on a ten-year basis. This difference in timeframe makes it difficult to compare AMMP and DDRDP impacts. A similar timeframe for measuring GHG emissions reductions is needed across the two programs.

For example, a recent analysis conducted by Sustainable Conservation found that when the GHG reductions associated with the two project types were considered across similar timeframes, the two main project types under AMMP – solid separation and flush-to-scrape conversion - had lower estimated costs per metric ton of CO<sub>2</sub>e (both under \$20/MTCO<sub>2</sub>e) compared to digester projects which ranged in the \$30-40 /MTCO<sub>2</sub>e average. Only compost pack barns were higher at about \$50/per MTCO<sub>2</sub>e (and this cost did not consider the CO<sub>2</sub>e sequestration benefits of applying compost from compost pack barns to grazed pastures). GHG emission reduction is just one of several potential measures of program impact and effectiveness.

Additionally, AMMP outperforms DDRDP on geographic impact. AMMP projects are much more accessible to the average dairy and livestock producer than the capital-intensive digester projects. As a consequence, AMMP projects can be found now in 13 counties on 107 dairies while digesters are in only 7 counties, also on 107 dairies. (We note that many more AMMP applicants are turned away from program funding compared to those applying for DDRDP).

The longevity of digester projects also remains unknown, calling into question the long-term impact of state investments. Digester developer contracts do not guarantee the technology's lifespan beyond ten years. The AMMP projects are not subject to such technology uncertainties as they are using less complex and more easily maintained project components. Will the methane reductions that are associated with digesters last beyond ten years? Or will additional investment be needed to replace aging digester systems?

Finally, many communities remain concerned about digester impacts on air and water quality. AMMP projects have been found to be more beneficial and less controversial among impacted communities.

AMMP is a more cost effective and far-reaching investment than dairy digesters. Thus, we urge CDFA to invest no less than 50 percent of the FY 2019-20 funds for dairy methane into AMMP projects.

**Additional resources on methane emissions reductions and managed/prescribed grazing:**

Stanley, P. et al. May 2018. Impacts of soil carbon sequestration on life cycle greenhouse gas emissions in Midwestern USA beef finishing systems. *Agricultural Systems*. Vol. 162. See: <https://www.sciencedirect.com/science/article/pii/S0308521X17310338#.WpHorNqe0qU.twitter>

Jensen, K. et al. 2015. Cattle Producers' Willingness to Adopt or Expand Prescribed grazing in the United States. *Journal of Agricultural and Applied Economics*, 47, 2 (2015): 213–242  
<https://www.cambridge.org/core/services/aop-cambridge-core/content/view/0C087EA2BF6706F47E280ADD00F618C0/S1074070815000061a.pdf/div-class-title-cattle-producers-willingness-to-adopt-or-expand-prescribed-grazing-in-the-united-states-div.pdf>

Stephensen et al. August 2004. Carbon Credit Potential from Intensive Rotational Grazing under Carbon Credit Certification Protocol. Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Denver, August 1-4, 2004  
<https://ageconsearch.umn.edu/bitstream/20225/1/sp04st02.pdf>

Phetteplace, H. et. al. July 2001. Greenhouse gas emissions from simulated beef and dairy livestock systems in the United States. *Nutrient Cycling in Agroecosystems*.  
<https://link.springer.com/article/10.1023%2FA%3A1012657230589?LI=true>

DeRamus et. al. December 2001. Methane Emissions of Beef Cattle on Forages. *Journal of Environmental Quality*. <https://dl.sciencesocieties.org/publications/jeq/abstracts/32/1/269>



October 14, 2019

California Department of Food and Agriculture  
1220 N Street  
Sacramento, CA 95814  
[Cdfa.oefi\\_ddrdp\\_tech@cdfa.ca.gov](mailto:Cdfa.oefi_ddrdp_tech@cdfa.ca.gov)

**RE: Comments in response to Public Listening Sessions, Dairy Digester Research and Development Program**

To whom it may concern:

Thank you for requesting comments regarding the Dairy Digester Research and Development Program.

Momentum ([www.buildmomentum.io](http://www.buildmomentum.io)) supports our clients in the design, development and deployment of advanced energy and transportation technologies. We work to leverage public and private investment to accelerate zero emission technologies while supporting job creation and economic development in communities throughout California. Since 2004, our team has helped deploy more than \$5 billion in projects, including microgrid, on- and off-road port vehicles, zero emission fleets, and 36 bioenergy projects. Our clients and partners include more than 300 original equipment manufacturers (OEMs), technology developers, Fortune 500 companies, and technology customers including many of California's seaports and airports, national labs, and universities.

CDFA's Dairy Digester Research and Development Program awards competitive grants to build dairy digesters that result in long-term methane emission reduction on California dairies and minimize or mitigate adverse environmental impacts. Since 2014/15, the DDRDP program has been allocated \$260 million from the Greenhouse Gas Reduction Fund (GGRF), with an additional \$34 million in 2019/2020, for a total of \$294 million. These investments are both historic and significant, and we applaud the state of California and the California Department of Food and Agriculture for having the wisdom to make such a transformational investment critical to meeting the state's GHG goals as well as supporting the ability of the state's dairies to meeting their own ambitious air quality objectives.

That said, we are concerned that many common best practices for the administration and management of grant programs have not been developed or implemented. These protocols, similar to what many grantseeking organizations are familiar with at California Energy Commission and CalRecycle, assure that the process of soliciting applicants, selecting awardees, and administering and managing awarded funds is undertaken in a manner that is **highly transparent** and **instills confidence** in the integrity and fairness of the process.



With that in mind, we are recommending that prior to the release of this year's solicitations that CDEFA undertake an internal audit of the DDRDP grant program to assess and consider for adoption the best practices and protocols that have been put in place at other GGRF granting agencies.

Consistent with the above, we specifically recommend:

## **1. Application Process**

- The Scoring Criteria should be amended to include a stand-alone scoring section specific to the qualifications of the organization submitting an application, similar to what applicants expect in other state applications for GGRF funds. Currently, organizational qualifications are embedded in the section entitled "Digester Project Plan and Long-Term Viability," a broad category worth only 20 points that includes a wide-ranging set of criteria including technology evaluation, site control, a detailed work plan, feedstock guarantees, timelines, operations and maintenance plans, etc. Scant attention is given in the current application to the ability of an applicant to demonstrate staff resources, technical expertise, project development history and experience to complete the project. We note that the current solicitation only includes a single question addressing organizational qualifications in a 20-point section.
- The Administrative Review Team and the Financial Review Team should be notified as to when an existing applicant has been unable to meet the timelines associated with previous work plans funded by the DDRDP program. Requests for contract extensions and changes by an awardee from previous years should be communicated and reflected in a current applicant's eligibility and score. Currently, reviewers are not given notice when an applicant has been historically unable to meet work plan deadlines.
- The application should be amended to include a standard Terms and Conditions contract.
- The application should describe to applicants the process that a successful awardee will need to utilize in order to request contract extensions and changes to approved budget and work plans. Currently, only existing awardees understand that there is an internal process for contract extension and changes, while new applicants provide work plans and budgets based on an understanding that the time available for project implementation is unyielding. This knowledge creates a significant competitive advantage to existing awardees.
- The "Project Readiness" section should include a realistic and serious evaluation of an applicant's ability to execute the project in the time frame required by the solicitation and proposed in the work plan, based upon prior history and experience developing similar projects.





- It should be confirmed that Applicants providing cost-share are able to provide proof of private cost share at the time of application. Confirmation of this cost share should be made directly with the bank or financing authority as part of the financial review process.
- The “Estimated Greenhouse Gas Emission Reductions” section should include an evaluation of GHG reduction per dollar per total project budget. Currently, there are project developers whose total project cost is 50%+ more expensive than competitors (per GHG reduction) but are able to diminish the impact of these costs by securing additional public funds rather than by enhancing efficient or competitive business models.
- Applicants should not be able to utilize other public funds as cost share. Doing so encourages double-counting of GHG benefits that should rightly be split amongst multiple agencies who are cost-sharing specific projects.

## 2. Application Review Process

- An Application Debrief should be mandatory by the scoring team or program staff immediately after the Notice of Proposed Award. This is standard best practice of the California Energy Commission.
- All applicants should receive Score Sheets and Score Notes from the scoring teams. These should be available for their own applications as well as competitor applications. This is standard best practice of the California Energy Commission.
- All applications should be available within 24 hours of the agency announcing awardees. This is standard best practice of the California Energy Commission.
- In all cases, *Application Debriefs, Score Sheets and Score Notes, and Full Applications* should be made public PRIOR to the execution of agreements and contracts with proposed awardees. This is standard best practice of the California Energy Commission.
- Applicants should not expect that projects funded with public funds are considered confidential. We recommend that CDFA allow applicants to submit a confidential appendix relative to sensitive financial or personal information, which would allow the agency to immediately distribute applications and remain consistent with the Public Records Act. Currently, CDFA takes in excess of a year to produce what are ultimately heavily redacted applications that make evaluation of project assumptions and benefits impossible for members of the public. We believe that this is inconsistent with the Public Records Act.



- CDFA should amend the application process to allow for an appeal process that allows applicants the ability to appeal an award after the Notice of Proposed Award is made available.

### 3. Transparency

- All contracts, requests for contract extensions or modifications, and major changes to budget and work plans should be noticed and available publicly. Other agencies administering GGRF funds generally submit awards and major contract changes in a publicly noticed meeting governed by California Public Meeting laws. Currently, no such public notice or review occurs for CDFA funding for contracts or major contract extensions.

We strongly support the goals and objectives of this program, as well as the designation of CDFA as administrator of GGRF monies. As our comments suggest, however, we are concerned that the manner in which these funds are currently managed is inconsistent with goals of transparency, and undermine the faith and confidence that all applicants should have in the integrity and neutrality of the process. We are concerned as well that the current process benefits previous awardees at the expense of new applicants that may have more robust business plans and technologies.

Thank you for your attention. We are hopeful and confident that CDFA receives these recommendations with the spirit of helpfulness and candor with which they were developed.

Please call with any questions or comments.

**Shawn Garvey**

Digitally signed by Shawn  
Garvey  
Date: 2019.10.15 16:27:27  
-07'00'

Shawn Garvey  
Chief Executive Officer

**From:** [Lindsay Leveen](#)  
**To:** [CDFA OEFI@CDFA](mailto:CDFA_OEFI@CDFA);  
**Subject:** Bloom BioGas Scam  
**Date:** Tuesday, October 15, 2019 9:02:44 AM

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I went to Bloom's website to read up on their BioGas Scam.

See the attached screenshot,

It looks like Bloom sometimes does not apply for air permits. What about the 3 to 4% decoking? What about the VOCs that slip through the Bloom Coffin ?

Where is the EPA?

Is the scumbag Ryan Jackson responsible for this???

Now the zinger Lying Sridhar and Venkat The Rat have come up with a "Proprietary pre-treatment conditioning system removes impurities in the biogas streams" Do they still hide hazmat ? Ms. Amend of the EPA we need the answer and we need the fine.

GREEN LIES MATTER



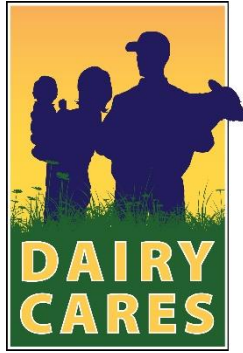
## Bloom Energy: Powered by Biogas

Biogas has become an important weapon to combat climate change. The destruction of methane, a biogas component with greater than 26 times the global warming impact as CO<sub>2</sub>, prevents harmful emission to the environment. Businesses and public organizations are utilizing biogas to produce electricity and improve their operations. Preventing emission and utilizing methane for primary power will displace electricity derived from the vulnerable, polluting, combustion-driven electric grid.

Bloom Energy is pioneering the effective use of fuel cells for onsite power generation using biogas. Key market applications such as dairies, landfills, wastewater treatment plants, and agricultural operations provide biogas that Bloom Energy technology can fully utilize. Bloom Energy's biogas solution is differentiated and provides the following value:

- ✓ Highest electrical efficiency in the marketplace generates maximum high-value power.
- ✓ Proprietary pre-treatment conditioning system removes impurities in biogas streams.
- ✓ Industry-leading reliability reduces maintenance costs and grid demand charges.
- ✓ Highest-ever power density minimizes application footprint.
- ✓ Combustion-less operation removes air permitting requirements in many installations.
- ✓ Turnkey execution and Bloom-provided service minimizes site maintenance needs.

Contact our team to learn more about how Bloom Energy can make the most of your biogas and deliver maximum value to your business.



October 16, 2019

Via email to: [cdfa.oefi@cdfa.ca.gov](mailto:cdfa.oefi@cdfa.ca.gov)

**Re: Comments on Dairy Digester Research and Development Program (DDRDP) and Alternative Manure Management Program (AMMP)**

On behalf of Dairy Cares, we are pleased to provide comments on the above-referenced programs. Dairy Cares is a coalition of California dairy companies and associations including the state's leading dairy producer trade associations and the major milk processing companies and cooperatives. Formed in 2001, Dairy Cares is dedicated to promoting long-term environmental and economic sustainability for California's family-owned dairy farms.

Dairy Cares continues to strongly support both the Alternative Manure Management Program (AMMP) and the Dairy Digester Research and Development Program (DDRDP) as highly effective and needed incentive programs to reduce dairy manure methane emissions consistent with state goals. These programs remain critical toward incentivizing voluntary methane reductions across the state's dairy farms.

Both programs are working well, as CDFA recently documented, already achieving more than half of the 40 percent manure methane reductions by 2030 sought by the state when the programs were implemented.

Given the substantial reduction in funding for 2019-2020, limiting incentive dollars to roughly one third of the funding provided in the previous two years, we encourage CDFA to not seek additional program changes at this time that will limit funding for the core program goals of reducing methane from manure management.

**Ongoing Support for Funding Distribution**

The dairy methane reduction programs (AMMP and DDRDP) have already successfully funded more than 200 projects during the first four rounds. Dairy operator interest in both programs remains high, and Dairy Cares supports continued funding within similar ratios under the flexible funding ranges. The flexible program funding ranges have provided an effective way for CDFA to weigh program demand, quality of projects funded in each

program, and the state's need to reduce dairy methane emissions consistent with state's ambitious reduction goals. We believe the funding ratio provided to date strikes an appropriate balance between digester and non-digester strategies and provides appropriate flexibility and discretion to determine final funding allocations for each program.

### **Response to Questions:**

#### **Changes to Project Technology**

CDFA adopted changes to the DDRDP in the previous cycle that allow new or pre-commercial technologies that provide benefits beyond GHG emission reduction, including nutrient removal and management. Dairy Cares strongly supported this addition, which allows technology installation to count toward matching funds for projects. Nutrient management technologies utilized on the back end of digester operations can provide additional water quality and environmental protection benefits as part of the project. Dairy Cares believes this is sufficient to encourage nutrient management technologies as part of project applications and does not see a need to allow direct funding under the program.

#### **Outreach Funding**

Dairy Cares does not see an immediate need for additional funding for outreach efforts to promote AMMP projects (Advancing Practices Farmer-To-Farmer) in this cycle. The outreach effort funding in the 2018-2019 cycle will produce tools, including videos, which will continue to inform and serve dairy operators at least for the next several years. Industry producer groups and trade organizations, including Dairy Cares, remain committed to ongoing industry education. Equally important, education about AMMP will also be a key focus at the 2020 California Dairy Sustainability Summit.

#### **Program Per-Project Funding**

Dairy Cares does not recommend or support any changes to the project maximum funding levels at this time. Both programs remain highly competitive, resulting in project awards below the per-project funding limitations. Reducing funding levels, however, could preclude funding for large or innovative projects that deserve additional funding and provide benefits commensurate with the funding level being sought.

#### **Demonstration Projects**

Dairy Cares supported funding for both AMMP and DDRDP demonstration projects in the 2018-2019 funding cycle. Given limited availability of funds in 2019-2020, Dairy Cares recognizes the need to fund DDRDP projects that move the industry toward looming 2030 goals for manure methane reduction. Dairy Cares also believes it is important to have time to assess the DDRDP demonstration project already funded to determine the cost effectiveness and scalability to achieve methane reduction goals.

We do support the continuation of "AMMP Demonstration Projects – New Technologies and Practices" program, and we suggest refining the criteria to support projects that are truly

innovative and provide multiple benefits, including methane reduction and improving water quality and building healthy soils.

Specifically, we support projects whose aim would be not just to avoid methane production by reducing anaerobic storage of manure volatiles solids, but also connect dairies with a way to ensure those solids achieve their highest and best use. We suggest emphasis on projects that use existing or novel technology to extract and divert manure solids and nutrients from the liquid waste stream, and which consider the ultimate fate of those diverted products. In many cases, the best use of these products will be to export them off dairies to improve whole-farm nutrient balances on the dairies, which in turn will reduce nitrogen leaching and improve water quality on dairies. Properly used, these exported solids can then improve soil and crop quality on other farms, by building soil health to increase water and nutrient retention, storing carbon, and partially replacing synthetically derived sources of nitrogen. Technologies and practices that improve the quality of manure-based products by killing pathogens and weed seeds – thus allowing their ultimate use in a wide variety of crops – should be given extra consideration. Likewise, improvements that allow farmers to easily use such products in their existing equipment, such as pelletization and granularization, should be considered to have extra merit. Such projects could help demonstrate that a renewable nitrogen recycling economy can be developed in California, with multiple economic and environmental benefits, including carbon sequestration in soil, healthy soils, water conservation, water quality protection, reduced reliance on fossil fuels to manufacture fertilizer and of course, reduced methane emissions.

### Conclusion

As always, we thank CDFA for their efforts to streamline implementation and effectively administer the DDRDP and AMMP. Both programs remain critical to dairy manure methane reduction efforts. We look forward to continuing to work with CDFA on these important programs.

Sincerely,



Michael Boccadoro  
Executive Director

CC: Charles “Chuck” Ahlem  
Secretary Karen Ross  
Undersecretary Jenny Lester Moffitt  
Amrith Gunasekara  
Geetika Joshi  
Dairy Cares Board

**From:** [Dr. Tryg Lundquist CP](#)  
**To:** [CDFA OEFI Alternative Manure Management Program Tech@CDFA](#); [CDFA OEFI Dairy Digester Research and Development Program Grant Solicitation@CDFA](#)  
**Subject:** Public comment submission  
**Date:** Wednesday, October 16, 2019 4:59:26 PM

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Dear CDFA,

I appreciate your request for public comment on the DDRDP and AMMP programs, which I consider to be a breakthrough for California and indirectly to the rest of the country. After many decades of policy stagnation, dairy bioenergy and methane emission avoidance technologies are at last being implemented at substantial scales. This is a great achievement. I also applaud CDFA's efforts to broaden the focus of the programs to other impacts and opportunities posed by dairy wastes, as described in the recent Public Listening Sessions.

Focusing primarily on only methane control does not promote integrated solutions to broader GHG emissions and crucial water quality problems. Funding digesters without stronger leveraging the program effort to promote proper management of the digestate seems a lost opportunity for synergy and influence for the benefit of dairy environmental stewardship.

In my opinion, funds should be provided for implementation of solutions for excess N and other concerns. Giving proposal scoring credits is insufficient because these CDFA programs are not only supporting methane reduction, but also supporting the dairy industry. In this way, CDFA takes on some responsibility for the stewardship of the wider dairy environment.

Furthermore, a risk of the current AMMP and DDRDP programs is the small number of technologies and vendors being awarded. If the design or materials of this select group do not perform beyond the short terms of the contracts, CDFA would seem to have little recourse. For this reason and to actually advance technology, the R&D efforts of the programs should be increased. The DEMO grants are a great start, but offering smaller grants for early stage applied research or pilots (starting at ~\$100k/year), and explicitly allowing university dairies to participate, would improve the efficiency of the use of the funds, promote modern solutions, tap into California's broader bioenergy entrepreneurship, and diversify the solution options.

Thank you for requesting public comment. I hope your very important programs continue grow to the benefit of California's people and economy.

Sincerely,

Tryg Lundquist, PhD, PE | Professor | Civil and Environmental Engineering | California Polytechnic State University | San Luis Obispo, CA 93407 | [ceenve.calpoly.edu/faculty/tlundqui](http://ceenve.calpoly.edu/faculty/tlundqui) | Mobile: +1 805-225-3352





October 16, 2019

California Department of Food and Agriculture  
1220 N Street  
Sacramento, CA 95814

**IN RE: Dairy Digester Research and Development Program**

Secretary Ross:

On behalf of Aemetis, thank you for accepting our comments regarding the Dairy Digester Research and Development Program (DDRDP). As you are aware, our company is in strong support of the goals and objectives of this program and has a long history of collaborating with the state of California to meet ambitious climate change objectives. We also strongly believe that the California Department of Food and Agriculture is well positioned to manage the funding associated with the DDRDP and AMPP program.

That said, we have significant concerns about the following:

- The lack of procedures, protocols, and transparency that are standard to other agencies administering Greenhouse Gas Reduction Fund (GGRF) monies undermines confidence amongst project developers, dairy farms and the public that a fair process exists to allocate limited public financial resources to the development of dairy digesters.
- The announcement in September, 2019 to allocate an additional \$34 million to an applicant that has cumulatively now been awarded \$100 million from CDFA and at least \$234,904,000 from all state agencies combined (ARB, CPUC, CEC, CAEATFA and CDFA). To date, the project developer has only commissioned 3 projects since 2015. The stacking of public funds into a single project developer is anti-competitive in nature and seriously undermines the intent of requirements that there are enough market participants to ensure competition and de-risk exposure to the program due to excessive concentration with only a few developers.
- The recurring inability of developer(s) to meet critical contractual deadlines for prior awards associated with building and commissioning its projects. Currently, one developer is nearing the end of contractual term for 11 projects funded in 2016/17 that are not yet commissioned, and has requested additional contract extensions as recently as August, 2019. We believe that this information was not effectively communicated to the scoring teams reviewing the most recent round of applications.



- As a partial result of an historic investment of public funds to a single project developer, that developer is able to offer significant cost share on projects utilizing mostly other state funds, rather than leveraging private capital. While this increases score for their applications, it also allows the project developer to offer additional inducements and incentives, often at public expense, to dairies that in turn severely constrain competition and distort the true costs and benefits associated with dairy digesters. As various grant programs often take multiple years to execute, this also causes unnecessary delay in project implementation. We strongly support having this and other GGRF grant programs encourage and reward applicants who offer alternative sources of private funding that are readily accessible and will speed projects to market in support of meeting California's aggressive GHG reduction goals.
- For instance, a project developer most recently awarded \$34 million in CDFA DDRDP funds has clearly identified through its success in prior years a precise benefit-cost ratio that it believes (evidently, correctly) optimizes CDFA scores. This is because scoring currently counts GHG benefits per dollar awarded from the current year's grant program. However, given that for this developer much of its cost-share is from other state programs, a more true and reasonable calculation would calculate benefit based on total project cost. This evaluation would show that the total cost of these projects is between 28% and 125% more expensive per metric ton of CO<sub>2</sub>e removed than projects proposed by competing project developers.

2015 – 2018	cost per MT of Developer 1	\$31.60/mt +51% premium
2015 – 2018	cost per MT of Developer 2	\$20.91/mt
2019	cost per MT of Developer 1	\$45.88/mt +127% premium
2019	cost per MT of Developer 2	\$20.33/mt
2019	cost per MT of Developer 3	\$35.92/mt

Ultimately, by virtue of more than \$240 million in public investment, the project developer is able to optimize scoring associated with their applications while shifting their more substantial costs to other state funding programs, unfairly increasing benefit cost ratios. This creates an appearance of “double dipping”.

One impact of this can be seen in the chart above, which shows that total project costs for Developer 1 increased by 50% from \$31.60/mt in 2015-2018 to \$45.88/mt in 2019. This increase, which corresponds with significant allocations of other public funds in 2018 and 2019 to the project developer, means that the score associated with cost share increases for Developer 1, but at the cost of additional state funding and the absence of private funds. Essentially, one set of state funds is providing the project developer additional cost share—and the points associated with that—for the same set of projects, allowing them to





out compete other project developers simply by increasing the total cost of their projects.

- As a result of the repeated delays in commissioning of projects, GHG emission reductions claimed are not being realized, and place CDFA's DDRDP program risk of falling seriously behind in helping California achieve its GHG reduction goals as well as regulatory mandates on emissions from dairies.
- Unlike other agencies managing GGRF funds, applicants to CDFA DDRDP program are not offered debrief sessions to identify areas for improvement. Additionally, score sheets and other scoring documents have not been publicly released in past years prior to announcement of awards, leaving unawarded applicants no way to evaluate the basis for award decisions. This is common practice for other GGRF granting agencies (CEC, for example), and provides full transparency into the scoring of applications and subsequent grant awards.
- CDFA DDRDP RFPs clearly state that applicants are expected to be able to complete their projects in the time allowed in the grant agreement. As a developer of two DDRDP projects, we in retrospect incorrectly assumed that these timelines were not negotiable. However, we understand that contract extensions have been approved for project developers as recently as August 2019 (for 11 projects awarded in 2017, but not yet built.) These contract extensions and contract changes were not noticed publicly (unlike California Energy Commission, which strictly requires public approval prior to major contract changes or extensions). This practice creates a significant competitive disadvantage for applicants who are NOT made aware that there is a provision for extending or modifying contracts, but rather submit applications based on the expectation that projects must be commissioned within the required period of time. This also creates a disincentive for developers to complete projects in a timely manner. Extensions should only be given on an exception basis and done so with full transparency and public review.

**Based on the above, we recommend the following:**

1. That CDFA DDRDP funds available for the upcoming 2019/2020 solicitation are utilized to fund those projects submitted in the 2018/2019 funding round that were found "eligible-but-not-funded" projects. This action would immediately expand the number of funded market participants to create a more diverse and robust market, and de-risk the overall program by reducing over-concentration with only a few developers. This would also move two new networks of dairy digesters forward quickly without the substantial cost and burden of an entire additional year of solicitation.
2. That CDFA audit the scoring from the recently announced 2018/2019 funding round in light of actual performance of prior awardees. If CDFA concludes that an





applicant's "past grant performance" did not demonstrate "timely completion of projects" (as clearly stated in the program RFP), the Agency should use its published authority to determine whether the 2019 projects "will receive funding"

in the form of a final grant contract. As prior performance can and should be used as criteria for future grants, we believe that such awards (2019) must be reconsidered immediately, before contracts are executed.

3. That CDFA audit DDRDP projects awarded in 2016 and 2017 that are obligated to be commissioned by June 2020 and evaluate the feasibility of the project developer being able to commission their projects on time. If that review finds them unable to complete their projects on time, Aemetis requests that those funds are immediately deployed to other project developers that have submitted "eligible-but-not-funded" applications.
4. That moving forward, CDFA ensure that diversity of applicants is a criterion of scoring and eligibility. This would negate the over-concentration of state resources to a small number of developers, thus depriving the market of competition and would provide the DDRDP program with more appropriate risk management profile.
5. That CDFA commit to a formal inter-agency GGRF working group to immediately revise and reform its grant making process in order to ensure full transparency and to conform to best practices adopted at California Energy Commission and CalRecycle to ensure consistency across all GGRF granting agencies. This will bolster confidence that public funds are being awarded to the most qualified applicants on a fair and consistent manner, and will improve communication between GGRF granting agencies to reduce grant stacking and double counting of GHG reduction.

### **About Aemetis**

In 2018, Aemetis applied for and was awarded 2 digester grants for dairies in disadvantaged communities of Stanislaus County. Aemetis is on track to commission both projects ahead of schedule and on budget, and plans to begin producing transportation fuel in Q1 2020 – nearly 6 months ahead of its contractual requirement. In late 2018, Aemetis raised \$33 million in private funding and executed signed letters of intent with 12 additional dairies, comprising the "Central Dairy Digester Cluster." This Cluster will produce RNG for use in transportation fuel and injection into PG&E's pipeline, under agreement. In 2019, Aemetis submitted 12 DDRDP applications. Six of Aemetis' applications were dairies in disadvantaged communities in Stanislaus County, which had seen no lagoon digester development until Aemetis' 2018 granted projects. The remaining 6 dairy projects are in northern Merced County. All Aemetis projects are "shovel ready", with the biogas easily convertible to RNG transportation fuel via its



existing ethanol biorefinery through new and existing off-take agreements or use in the fuel refinery process. In addition, 100% of Aemetis' required matching funds come from

a private equity investment; the Company can immediately deploy capital for the projects, with no grant stacking or risk of funding shortfall or project delay.

Headquartered in Cupertino, California, Aemetis is an advanced renewable fuels and biochemicals company focused on the production of advanced fuels and chemicals through the acquisition, development and commercialization of innovative technologies that replace traditional petroleum-based products by conversion of first-generation ethanol and biodiesel plants into advanced biorefineries.

Founded in 2006, Aemetis owns and operates a 65 million gallon per year capacity ethanol and animal feed production facility in Keyes, California. Aemetis also owns and operates a 50 million gallon per year capacity renewable chemical and advanced fuel production facility on the East Coast of India, producing high quality, distilled biodiesel and refined glycerin for customers in Europe and Asia. Aemetis recently announced plans to build and operate a 12 million gallon per year advanced cellulosic ethanol production facility in Riverbank, California, which will utilize abundant nearby agricultural waste as feedstock to produce below zero carbon intensity (CI) transportation fuel. Aemetis also operates a research and development laboratory and holds many granted patents on technology related to the production of renewable fuels and renewable chemicals. Aemetis is a publicly traded company (NASDAQ: AMTX) with \$150 million in annual revenues and over 140 employees and is publicly traded on the NASDAQ stock market under the symbol AMTX.

Thank you in advance for the consideration of our comments and suggestions.

Sincerely,

Andrew B. Foster  
Chief Operating Officer  
Aemetis Biogas LLC  
20400 Stevens Creek Blvd., Suite 700  
Cupertino, CA 95014  
[andy.foster@aemetis.com](mailto:andy.foster@aemetis.com)





CENTER FOR  
FOOD SAFETY



California Department of Food and Agriculture  
Attn: Secretary Karen Ross  
1220 N Street,  
Sacramento, CA 95814  
Via Email: [cdfa.oefi@cdfa.ca.gov](mailto:cdfa.oefi@cdfa.ca.gov)

October 16, 2019

**Re: California Department of Food and Agriculture Dairy Digester Research and Development Program**

Dear Secretary Ross,

We, the undersigned organizations, are deeply committed to tackling our state's climate crisis, while simultaneously improving air and water quality throughout the state. We envision and support investments, programs, and policies that create environmentally sustainable and just agricultural systems and truly clean energy solutions. We write in response to a recent request for comments on the Dairy Digester Research and Development Program (DDRDP), which misses the mark by instead doubling down on the problem of intense consolidation in the dairy industry that has contributed to harmful local impacts, and will delay a transition away from dirty energy. CDFA should support manure management practices for dairies that shift farmers away from the dependence on extremely high herd densities, which cause manure excess and result in over-application on cropland. The agency should additionally ensure that dairy farms receiving State funds meet water and air quality standards as a prerequisite. A holistic approach to manure management that accounts for methane, groundwater quality, and air quality is desperately needed.

The largest dairies in the state are concentrated in the Central Valley, which suffers from widespread groundwater contamination, poor air quality, heavy truck traffic, and high rates of asthma, among several other chronic and acute health vulnerabilities. Large industrial dairies contribute to these problems. These operations result in nitrate contamination in groundwater

and produce air contamination beyond methane, that have local and basin-wide impacts. In the San Joaquin Valley, dairies are the largest source of ammonia, which is both a toxic air contaminant and a main precursor to fine particle pollution, and also a significant source of smog-forming volatile organic compounds (VOCs)<sup>1</sup>. A recent report on nitrate impacts from Central Valley dairies documents elevated nitrogen concentrations beneath all dairies participating in the dairy representative monitoring program and notes significant nitrogen contamination of both deep and shallow groundwater under dairies<sup>2</sup>.

Dairy digesters do not address the dairy's contribution to air pollution and water contamination, which result in large part from dairy operations beyond manure lagoons; for example, contamination from land application of manure, silage, pre- and post-digester management of manure, and dust generally all contribute to local pollution. Approximately 96% of nitrate contamination is caused by nitrogen applied to cropland, 33% of which is from animal manure applications<sup>3</sup>. Similarly, digesters do not eliminate the noxious odors that impact nearby neighborhoods. Furthermore, digesters do nothing to address the massive climate impacts of enteric emissions which account for about half of the methane emissions from dairies<sup>4</sup>. In fact, digesters likely have a deleterious impact on the local environment by encouraging increased herd sizes to generate greater revenue from energy production and by incentivizing greater concentration of dairies around energy infrastructure. Concentrating cows and their waste will only increase the air, odor, and water impacts from dairies.

While we appreciate CDFA's consideration of incorporating programs and projects to reduce nitrate contamination of groundwater into the digester program, we cannot support an approach to this issue that relies on subsidizing dairies that continue to pollute the air and water. The dairy industry must be accountable to existing water and air quality regulations, and paying dairies to do so sends an inappropriate signal: that failing to protect water and air quality will be rewarded by State investments. Instead of paying dairies to comply with climate, air and water quality mandates, compliance should be a precondition for receiving funding from the State.

The State should refrain from putting more and more financial resources into operations in the form of dairy digesters, with no clear evidence of the benefits to disadvantaged, nearby communities. Awarded projects in the past were deemed beneficial to disadvantaged

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<sup>1</sup> San Joaquin Valley Air Pollution Control District. (Feb 2012). "Air Pollution Control Officer's Revision of the Dairy VOC Emission Factors." [https://www.valleyair.org/busind/pto/emission\\_factors/2012-Final-Dairy-EE-Report/FinalDairyEEReport\(2-23-12\).pdf](https://www.valleyair.org/busind/pto/emission_factors/2012-Final-Dairy-EE-Report/FinalDairyEEReport(2-23-12).pdf) (p. 7)

<sup>2</sup> Central Valley Dairy Representative Monitoring Program. 2019. Summary Representative Monitoring Report (Revised). April 19, 2019

<sup>3</sup> Harter, Thomas. Addressing Nitrate in California's Drinking Water With a Focus on Tulare Lake Basin and Salinas Valley Groundwater Report for the State Water Resources Control Board Report to the Legislature. Feb 2012.

[http://watermanagement.ucdavis.edu/files/2214/5886/6964/Harter\\_et\\_al.\\_2012\\_Addressing\\_Nitrate\\_in\\_CA\\_Drinking\\_Water.pdf](http://watermanagement.ucdavis.edu/files/2214/5886/6964/Harter_et_al._2012_Addressing_Nitrate_in_CA_Drinking_Water.pdf) page 3

<sup>4</sup>CA Air Resource Board. (2019). GHG Current California Emission Inventory Data, <https://ww2.arb.ca.gov/ghg-inventory-data>

communities despite applicants' failure to demonstrate any meaningful or verifiable benefits to disadvantaged neighborhoods. While applicants for funding assistance for digesters through the DDRDP are required to demonstrate benefits to disadvantaged communities, these applications do not point to any direct reductions in air pollution from dairies as a result of digester installation and operation. Instead, we find that existing DDRDP applicants rely on the purported air quality improvements from the use of biomethane to replace diesel in trucks. Unfortunately, this relies on several unsupported assumptions: that these vehicles would not transition away from diesel without the digester project, that diesel replacement is based on sure contracts with fleet operators, and that the diesel emissions reductions will take place locally. We remain deeply concerned that the most recently awarded 2019 projects will follow in the same footsteps, without any demonstrable contribution to the environmental, social, and economic wellbeing of nearby residents.

The State has invested hundreds of millions of dollars in the development of dairy digesters that will create new revenue streams in the form of gas sales and credits (e.g. Low Carbon Fuel Standard Credits) for the largest, most intensively polluting dairy farms, while the vast majority of smaller dairies are left out of both the investments and the resulting revenue streams. Biomethane production depends on massive operations and only makes sense for dairies that produce large amounts of manure handled through wet storage lagoons. Based on our estimates from the information that we have been able to obtain, dairies that received funding for digester awards averaged ~7,000 cows, though this number could be higher as data has not been made easily available to the public. By further incentivizing methane creation, biomethane production, and markets for biogas, the State is choosing winners and losers: large industrial dairies as winners, and smaller dairies as losers. From an environmental and environmental justice perspective, investments in digesters will have the perverse effect of further intensifying herd densities, further solidifying the unsustainable practice of lagoon manure management, and driving small family owned operations out of business.

Not only are the State's investments into dairy digesters only accessible to the largest dairies in the state, they are also concentrated among only two digester developer companies, California Bioenergy LLC (CalBio) of Dallas, Texas and Maas Energy Works, Inc. (Maas Energy) of Redding, California. These two developers have captured 100% of the funds for DDRDP's 2017-2019 awards.<sup>5</sup>

Furthermore and despite misleading statements to the contrary, biomethane is not a clean fuel.<sup>6</sup> Burning manure-produced gas emits the same air contaminants as the combustion of fossil gas. Moreover, biomethane production costs are too high, and the supply is too constrained, for it to

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<sup>5</sup> CDFA. 2019 Dairy Digester Research and Development Program Projects Selected for Award of Funds. [https://www.cdfa.ca.gov/oefi/ddrdp/docs/2019-DDRDP\\_ApplicationsAwarded.pdf](https://www.cdfa.ca.gov/oefi/ddrdp/docs/2019-DDRDP_ApplicationsAwarded.pdf)

<sup>6</sup> Food and Water Watch. Issue Brief: Biogas From Factory Farm Waste Has No Place in a Clean Energy Future <https://www.foodandwaterwatch.org/insight/biogas-factory-farm-waste-has-no-place-clean-energy-future>



be a sustainable or financially feasible long-term solution. Even in the most optimistic renewable gas scenarios, pipeline gas blends would remain 56% fossil in 2050.<sup>7</sup> Subsidizing the production of biomethane on the backs of rate-payers and tax-payers locks California into maintaining a costly gas distribution system that the State must transition away from to meet its climate goals and protect consumers.<sup>8</sup>

The DDRDP is based on a false premise that by capturing methane from cow manure produced by large, industrial dairies with extremely expensive technology, the State will curb greenhouse gas emissions and help dairy farmers remain in business, all while benefiting local communities. Unfortunately, this premise is misleading and taking California down the wrong path. CDFA should focus instead on ways of helping the dairy industry reverse the trends that have caused severe pollution and economic challenges that will only become increasingly unsustainable in the long term.

Sincerely,

Julia Jordan

Policy Coordinator, Leadership Counsel for  
Justice & Accountability

Kassandra Hishida, Coordinator  
Community Alliance for Agroecology

Kevin Hamilton, RRT, Chief Executive  
Officer  
Central California Asthma Collaborative

Genevieve Gale, Executive Director  
Central Valley Air Quality (CVAQ)  
Coalition

Allen Hernandez, Executive Director  
Center for Community Action &  
Environmental Justice (CCA EJ)

Rebecca Spector, West Coast Director  
Center for Food Safety

Nayamin Martinez, MPH, Director  
Central California Environmental Justice  
Network

Lauren Cullum, Policy Advocate  
Sierra Club

Erica Martinez, California Policy Advocate  
Earthjustice

Jennifer Clary, Water Programs Manager  
Clean Water Action

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<sup>7</sup> Energy and Environmental Economics, Draft Results: Future of Natural Gas Distribution in California (Slide 15) [https://ww2.energy.ca.gov/research/notices/2019-06-06\\_workshop/2019-06-06\\_Future\\_of\\_Gas\\_Distribution.pdf](https://ww2.energy.ca.gov/research/notices/2019-06-06_workshop/2019-06-06_Future_of_Gas_Distribution.pdf)

<sup>8</sup> Energy and Environmental Economics, Draft Results: Future of Natural Gas Distribution in California (Slide 6) [https://ww2.energy.ca.gov/research/notices/2019-06-06\\_workshop/2019-06-06\\_Future\\_of\\_Gas\\_Distribution.pdf](https://ww2.energy.ca.gov/research/notices/2019-06-06_workshop/2019-06-06_Future_of_Gas_Distribution.pdf)

**From:** [Paul Sousa](#)  
**To:** [CDFA OEFI@CDFA](mailto:CDFA.OEFI@CDFA)  
**Subject:** AMMP comments  
**Date:** Wednesday, October 16, 2019 3:26:45 PM

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Please accept these comments from Western United Dairies.

This comment focuses on ARB's GHG calculator for the AMMP program. I appreciate the streamlining that was done to the calculator in order to make it easier to use. However, some of the streamlining has removed functionality of the tool and accuracy of the results. For example, if a dairy is implementing a compost bedded pack barn, the animals going into that barn may be dry cows or heifers coming off of a flushed freestall barn. The calculator, as configured for the last round, does not allow for this scenario. In this case the calculator produces a result that is not reflective of the project being proposed and therefore not accurate. If the calculator should be configured with more options that were still easy to select, but more closely matched the different projects that were being proposed.

I would also like to reiterate a comment that I have made in the past and that is the total points awarded for GHG emissions reductions should be all of the 35 points in that category and none of the those points should go to correctly filling out paperwork. Correctly filling out the calculator or project narrative should be requirements for a complete application package and should not take the place of GHG reductions. This would ensure that projects that achieve higher GHG reductions get more points and therefore favored for funding.

The request for grant applications states that "CDFA will fund those projects that produce the highest results in permanent annual greenhouse gas emissions reductions. . ." however out of the possible 100 points total that applicants are able to receive for their application, only 15 points are actually for GHG emissions reductions. The "Estimated Greenhouse Gas Emissions Reduction" section does provide 35 points however 20 of those points are for correctly filling out the application leaving only 15 points for GHG emissions reductions. WUD suggests that more points be awarded to the actual goal of the program for reducing manure GHG emissions.

WUD would again like to thank CDFA for implementing AMMP and allowing dairies of all sizes from throughout California to implement projects to reduce their manure methane emissions. We look forward to working with our members and CDFA to implement another successful round of AMMP projects in the near future. If there are any questions or if I can be of any service to CDFA on this issue please let me know.

Paul Sousa

Western United Dairymen

October 16<sup>th</sup>, 2019

To Whom It May Concern:

On behalf of the community interested in utilizing vermifiltration for manure management purposes it is our pleasure to submit the attached letter and associated research to demonstrate empirically the efficacy of vermifiltration as a method for sustainable and economical manure management on California flush dairies. For over three years we have been operating a vermifiltration demonstration system at Fanelli Dairy in Hilmar, California with collaborators from across the industry including researchers from the University of California Davis, the USDA, and dairy industry consultants to rigorously test and validate the performance of the practice over this time.

As you will see from our research vermifiltration's ability to reduce Methane emissions on flush dairies is significant and we believe should be considered for funding as an alternative manure management practice as defined under the AMMP and DDRP programs. In addition, we firmly believe further demonstration projects would advance alternative manure management methods broadly, and thereby, should be continued and demonstration funds should be increased for any treatment practice that meets minimum performance criteria defined by industry participants knowledgeable in the range of treatment practices and their associated costs and benefits.

Thank you for this opportunity to comment and suggest publicly regarding these valuable programs for California dairies.

Respectfully,

Matt Tolbirt  
CEO

# Request to Include vermifiltration among the allowed practices in the Alternative Manure Management Program.

We propose to include the vermifiltration among the alternative manure management practices allowed to participate in the AMMP program.

The vermifilters able to remove with very high efficiency solids from manure wastewater and treat aerobically separated solids. During vermifiltration, organic wastewater is applied to a bed of organic media (e.g., woodchips, wood shavings) seeded with earthworms, and organic matter is subsequently degraded through the symbiotic activities of earthworms and microorganisms (Zhao et al., 2010; Li et al., 2013).

Recent literature and current, ongoing monitoring from a California dairy vermifilter system confirm that:

- 1) Methane emissions are negligible.
- 2) Vermifiltration systems removes organic solids with high efficacy and;
- 3) Vermifiltration treats the separated solids aerobically.

## Vermifiltration

Vermifiltration is a biological treatment process using earthworms and microorganisms to degrade the wastewater organic load. The vermifilters treats water onsite, converting wastewater into a reusable asset and contaminants into a natural and nutritious fertilizer.

The use of vermifiltration in dairies provides numerous co-benefits in addition to the treatment of wastewater. Vermifiltration can be utilized on farms of any size with confined livestock and results in large benefits relative to the anaerobic lagoons and anaerobic digesters. Benefits of vermifiltration include:

- 1) reduction of greenhouse gas (GHG) emissions of CH<sub>4</sub> and N<sub>2</sub>O
- 2) the reduction of soil and air pollution from nitrogen and ammonia,
- 3) the production of organic fertilizer for improvement of soil health and soil carbon sequestration.
- 4) multiple use of treated water, including irrigation and flushing. The technology can be used to treat pond water so that it can be used in irrigation with no harmful effects on agriculture.
- 5) Simple technology and low energy use requirements
- 6) The technology reduces or eliminates the lagoon pond odor.

Currently operational vermifiltration system in dairy are designed to treat about 100 to 1,500 cows daily, up to 200,000 gallons of water per day, and work continuously throughout the year.

## Vermifiltration Research

### 1) No methane emissions

Removal of CH<sub>4</sub> from the atmosphere was measured in vermifilters treating pig fresh liquid manure by Luth et al. (2011).

The effects of vermifiltration manure treatment system on GHG emissions at a commercial dairy located in the San Joaquin Valley was published in the paper by Lai et al (2018). The study found that vermifiltration reduced ammonia emissions by 90.2% without significantly increasing emission of N<sub>2</sub>O, CH<sub>4</sub>, or CO<sub>2</sub>.

Methane emissions reported for the vermifilters were 0.8 kg day<sup>-1</sup>, and 0.3 kg day<sup>-1</sup> from the treated effluent water. This resulted in an annual CH<sub>4</sub> emission, when accounting for effects of temperature fluctuations on CH<sub>4</sub> fluxes, of 3.68 tCO<sub>2</sub>eq yr<sup>-1</sup> and 1.38 tCO<sub>2</sub>eq yr<sup>-1</sup> from the vermifilter and treated water respectively. In total, annual CH<sub>4</sub> fluxes from and after the vermifilter were circa 0.07 tCO<sub>2</sub> equivalent per dairy cow per year. Annual CH<sub>4</sub> lagoon emissions were 98% higher than emission from the vermifilter when scaled up to the 5.7 million-liter lagoon.

### 2) Solid separation from wastewater

Among the numerous papers on vermifilters recently published (a list is included at the end of this document), benefits include the removal from wastewater of total suspended solids, volatile solids, total dissolved solids, fat oils and grease, total nitrogen, ammonia, phosphorus, pathogens and metals (Sinha et al 2008; Luth et al 2011, Singh et al 2017, 2018, Lai et al 2018, Whang et al 2013).

### 3) Aerobic conditions

Research publications also documented the aerobic operation of vermifilters. For example, Luth et al. (2011) describes how reactions in vermifilters are prevalently aerobic and do not emit methane and ammonia. Singh et al (2018) reported an abundance of dissolved oxygen (DO) in vermifilters, in agreement with what was previously reported by Binet et al. 1998 and Brown 1995. Singh et al (2017) reported that aerators or mechanical devices are not required in vermifilters to maintain the filter bed aerobic.

## Measurements in a California dairy vermifilter

Measurements were conducted at the Fanelli Dairy, a commercial dairy located in the San Joaquin Valley that houses a total of 1,300 cows, including 760 milking cows. The free-stall barn is flushed 3 times daily and wastewater is stored in an open anaerobic lagoon. The farm is equipped with a rotary screen solids separator to remove sand and other solids. The influent water (INF) is applied for 10 min to the vermifilter's surface (measuring 5940 sq feet) using a sprinkler system. The applied water percolates to the bottom of the vermifiltration system where the resulting effluent water (EFF) exits the vermifiltration system. The vermifilters is a pilot study that doesn't treat all of the wastewater produced at the dairy. The volume of wastewater collected after flushing and the volume of wastewater treated by the vermifilter is used to determine the percent of water and cows effectively treated by the vermifilter.

## The measurements

Volatile solids (VS), the fraction of the wastewater responsible for methane generation, were measured monthly before and after the vermifilter. Water samples were sent to a lab for quantification of the concentration of volatile solids. Measurements started in March 2019.

Dissolved oxygen was measured continuously by an optical sensor (Insitelog Model 1000) located in the effluent and inside the vermifilter bed.

## The Data

### 1. Volatile solids removal

Volatile solids concentrations in wastewater before and after the vermifilter were compared. The percent volatile solids removed by the vermifilter was calculated as the difference between the concentration in the wastewater entering and exiting the system (as in Singh et al 2018). On average, the vermifilter removed **85%** of the volatile solids present in the wastewater. Values ranged between 82% and 89%.

$$\% \text{ Removal Efficacy} = (VS_{\text{INF}} - VS_{\text{EFF}}) / VS_{\text{INF}}$$

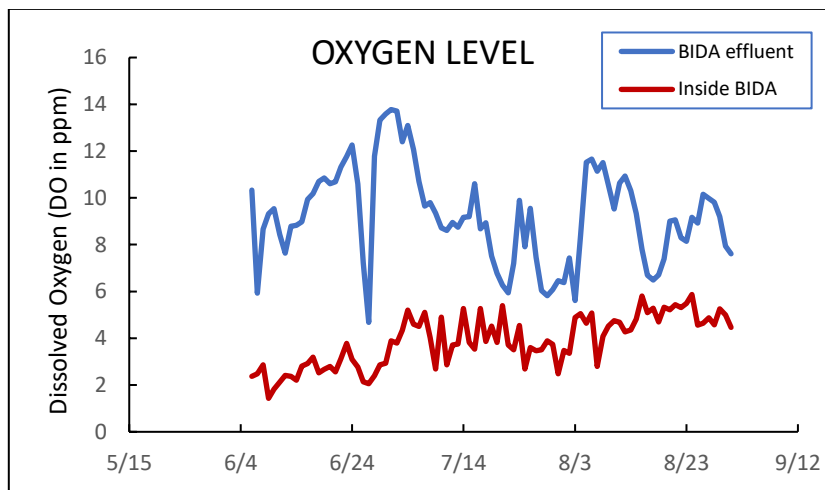
	VS <sub>INF</sub>	VS <sub>EFF</sub>	VS removed	% removed
<b>March 2019</b>	18,000	2,000	16,000	89%
<b>April 2019</b>	8,400	1,300	7,100	85%
<b>May 2019</b>	18,000	2,800	15,200	84%
<b>July 2019</b>	12,000	2,200	9,800	82%
<b>AVERAGE</b>	14,100	2,075	12,025	85%

Reduction of Total Suspended Solids (TSS) was 96%. This TSS removal is in agreement with measurements of TSS monitored monthly in different dairy vermifilters operations (white paper available at [biofiltro.com](http://biofiltro.com) where we report the data for the different dairies).

### 2. Aerobic conditions during treatment

The vermifilter effluent collects water treated over the entire surface, and thus accounts for possible localized heterogeneity. Dissolved oxygen concentrations are used in wastewater treatment systems to assess the extent of aerobic conditions during treatment. Oxygen is also used in composting facilities to monitor aerobic conditions of the composting process and atmospheric oxygen levels are often measured (% oxygen). However, it is the microorganisms in the water film that degrade the organic matter. Saturated DO in the water film is a much more important indicator of favorable composting conditions than bulk percent DO measurements (Crouch and Sauer, 2013). The ability of oxygen to dissolve in water depends on both oxygen concentration in the air space and temperature.

The threshold for a good quality aerobic processes in composting is set to 1 ppm (Crouch and Sauer, 2013). We show below that the Dissolved Oxygen daily levels at Fanelli during the period June-August 2019 were consistently well above the 1 ppm limit.



**Figure: Monitoring of Dissolved Oxygen levels in vermifilter effluent and inside the vermifilter bed at the Fanelli dairy in 2019. Symbols represent daily averages of 15-minute readings. A 5 ppm at a temperature of 20 °C corresponds to a 11% content.**

## Results and Conclusions

Our measurements on a California dairy, in accordance with published literature on vermifilters, show that the system is a very efficient system to remove volatile solids from dairy wastewater, and that the treatment is aerobic.

The quantification of the vermifilter methane emissions is easily achievable by 1) monitoring the quantity of volatile solids left in the vermifilter effluent and 2) by applying in the AMMP calculation tool for project conditions the methane conversion factor (MCF) of aerobic systems. The use of the MCF factor of aerobic systems will be justified by monitoring the values of dissolved oxygen levels in the vermifilter effluent.

These two parameters (dissolved oxygen levels and volatile solids in the effluent) can also be used to monitor the status of the operation of a vermifilter. If the system is not working properly, living conditions will become less than optimal for the earthworms and result in a consequent reduction in their population density and ultimately result in a lower VS removal efficacy and in a lower dissolved oxygen concentration.



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