



20 May 2018

To:  
California Air Resources Board and  
California Department of Food and Agriculture,  
[SLCP@arb.ca.gov](mailto:SLCP@arb.ca.gov)

RE: Dairy and Livestock Subgroup #3 Request for Ideas

Thank you for providing the opportunity for Sequoia ForestKeeper®, Todd Shuman, and Jan Detrick to submit ideas for researching to reduce climate impacts from dairies and livestock.

We request that California Air Resources Board (CARB) and California Department of Food and Agriculture (CDFA) explore, fund, and promote (through funding for pilot projects) measures to reduce enteric methane emissions from livestock by studying the practice of eating and wasting less beef, and making sure it is grass-fed beef.

We also request that California Air Resources Board (CARB) and California Department of Food and Agriculture (CDFA) explore, fund, and promote (through funding for pilot projects) measures to reduce enteric methane emissions from livestock by studying the research discussed below that would modify livestock feed with quantities of red seaweed to reduce methane production.

<http://www.publish.csiro.au/an/AN15576>

Attached is the comment letter from Todd Shuman, Ara Marderosian, and Jan Dietrick submitted January 17, 2017 to Ryan McCarthy and Craig Segal, California Air Resources Board (CARB), containing relevant issues that should be considered.

Thanks for the opportunity to comment.

Mr. Ara Marderosian,  
Executive Director  
Sequoia ForestKeeper®  
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Jan Dietrick, MPH, Steering Committee,  
Ventura County Climate Hub,  
Ventura, CA 805.746.5365  
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Todd Shuman, Senior Analyst, Wasteful Unreasonable Methane Uprising  
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<http://wumu-wuru.my-free.website/>

Pasted below is our comment submitted on 18 March 2018

**From:** Ara Marderosian [<mailto:ara@sequoiaforestkeeper.org>]  
**Sent:** Sunday, March 18, 2018 11:56 AM  
**To:** 'SLCP@arb.ca.gov' <[SLCP@arb.ca.gov](mailto:SLCP@arb.ca.gov)>; 'SLCP@arb.ca.gov' <[SLCP@arb.ca.gov](mailto:SLCP@arb.ca.gov)>; 'SLCP@arb.ca.gov' <[SLCP@arb.ca.gov](mailto:SLCP@arb.ca.gov)>  
**Cc:** Todd Shuman <[tshublu@yahoo.com](mailto:tshublu@yahoo.com)>  
**Subject:** Dairy and Livestock Subgroup #3 Request for Ideas Docket has Opened

18 March 2018

To California Air Resources Board and California Department of Food and Agriculture,

RE: Dairy and Livestock Subgroup #3 Request for Ideas

**From:** California Air Resources Board [<mailto:carb@public.govdelivery.com>]

**Sent:** Thursday, March 15, 2018

**Request for Ideas (RFI) for Dairy Research**

**Subgroup #3 (Research Needs, Including Enteric Fermentation)**

The Dairy and Livestock Subgroup #3 (Research Needs, Including Enteric Fermentation) is requesting RFI submissions to define research needs and knowledge shortfalls that can be addressed to facilitate the reduction of dairy and livestock methane emissions. All interested parties are invited to submit research ideas that can help California effectively achieve SB 1383 goal

RFI submissions will be pre-screened for completeness and appropriate content. Pre-screened submissions will be reviewed by Subgroup #3 committee members before they are drafted into a Dairy Air Research Prospectus. The completed prospectus will be used to provide recommendations for the most feasible research needed to address SB 1383 goals under each of the knowledge shortfalls identified previously by Subgroup #3.

Completed RFI Submission Forms are to be sent to [SLCP@arb.ca.gov](mailto:SLCP@arb.ca.gov). The deadline to submit is **May 31, 2018 at 5:00 pm (PDT)**.

Thank you for providing the opportunity for Sequoia ForestKeeper® to submit ideas for researching to reduce climate impacts from dairies and livestock.

We request that California Air Resources Board (CARB) and California Department of Food and Agriculture (CDFA) explore, fund, and promote (through funding for pilot projects) measures to reduce enteric methane emissions from livestock by studying the practice of eating and wasting less beef, and making sure it is grass-fed beef.

According to the California Academy of Sciences, the best research project for reducing methane production from livestock concentrated feed operations (CAFOs) and dairies is to study eating and wasting less beef, and making sure it is grass-fed beef. (<https://www.planetvision.com/blog/2017/01/24/wheres-the-sustainable-beef>)

This California Academy of Sciences report also speaks to the previously suggested research project of adoption of the red seaweed methane mitigation approach, which Dr. Jim Stewart previously mentioned in oral comments to CARB, that may have the unavoidable side effect of causing livestock to emit bromoform, a pollutant that can degrade the ozone layer in the upper atmosphere.

“Another avenue of research is getting creative with what beef cattle eat to reduce their methane emissions. Scientists at James Cook University in Australia have found that feeding beef cattle a small amount of seaweed can [reduce their methane emissions](#) by 70 to 99 percent, an exciting development. Unfortunately, there’s some indication that cattle eating seaweed may have the side effect of emitting bromoform, a pollutant that can degrade the ozone layer in the upper atmosphere that protects us from harmful UV radiation. Researchers from Stanford University are [reportedly](#) taking the same seaweed from Australia to see if they can replicate these results and perhaps find a way to reduce all damaging emissions.”

Pasted below is the previous submission by Todd Shuman, which Sequoia ForestKeeper® is resubmitting for the record as the most salient section from previous group SLCP RS comments submitted to CARB and CDFA in January, 2017 concerning this matter to inform the Dairy and Livestock Subgroup #3 that convened on August 14, 2017.

Thanks for the opportunity.

Mr. Ara Marderosian,  
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----- Forwarded Message -----

**From:** Todd Shuman <[tshublu@yahoo.com](mailto:tshublu@yahoo.com)>

**To:** "[SLCP@arb.ca.gov](mailto:SLCP@arb.ca.gov)" <[SLCP@arb.ca.gov](mailto:SLCP@arb.ca.gov)>; "[slcp@arb.ca.gov](mailto:slcp@arb.ca.gov)" <[slcp@arb.ca.gov](mailto:slcp@arb.ca.gov)>

**Sent:** Monday, August 14, 2017 1:07 PM

**Subject:** Enteric Emission Reduction Strategies, with INTA Attachments. Subgroup #3

Kickoff meeting for Subgroup #3 (Research Needs, Including Enteric Fermentation)

DATE: August 14, 2017

TIME: 1:00PM - 3:00PM

LOCATION: CA Dept of Food and Agriculture Building

1220 N Street

Sacramento, CA 95814

WEBCAST: <https://www.cdfa.ca.gov/LiveMediaStream.html>

EMAIL FOR COMMENTS DURING MEETING: [SLCP@arb.ca.gov](mailto:SLCP@arb.ca.gov) CONFERENCE

CALL LINE:

1-800-593-9891 (Passcode: 9108215)""

To ARB and CDFA,

I request that ARB and CDFA explore, fund, and promote (through funding for pilot projects) measures to capture and or reduce enteric methane emissions from livestock. I am resubmitting for the record the most salient section from previous group SLCP RS comments submitted to ARB in January, 2017 concerning this matter so as to inform the Dairy and Livestock Subgroup #3 that is being convened on August 14, 2017. I am also forwarding some of the attachments that were submitted to ARB last January, including INTA documentation and translations, as well as the full comments that were submitted. I also request that ARB and CDFA seriously explore and encourage widespread adoption of the red seaweed methane mitigation approach that Dr. Jim Stewart has previously mentioned in oral comments to ARB. Below is an abstract concerning this approach that has been demonstrated in vitro. In vivo demonstration of this approach is reportedly currently under way.

Sincerely,

Todd Shuman, 2260 Camilar Dr. Camarillo, CA 93010 <http://wumu-wuru.my-free.website/>

A:

Excerpt from January 17, 2017 Comments to ARB:

"We again propose that CA ARB, the legislature, and the Governor explore and consider enacting some or all of the following to reduce enteric emissions in California: measures to promote mandatory livestock herd size reduction; mandates that compel the development of enclosed barns-vented-to-biofilter treatment systems that capture emitted dairy-associated methane before it escapes into the atmosphere \*\*; and requirements that grazing cattle shall wear gas-collecting, plastic-bag-expanding backpack technology that captures emitted enteric methane so it can be burnt rather than belched into the atmosphere.

Concerning the latter strategy, we submit for the record the attached Government of Argentina INTA

Reports, in Spanish and Google-translated English, as well as again submitting internet links concerning this approach. [Use Google Search to access the following links to see demonstrations of the technology: <http://www.fastcoexist.com/.../these-backpacks-for-cows...>, <http://www.dailymail.co.uk/.../Now-THATS-wind-power-Cows...>, <http://grist.org/.../crazy-clip-shows-what-happens.../>... See also the video, on YouTube, titled "producción de energía de gases ruminales"]

We propose that CA ARB explore the idea of evaluating, replicating, financing, and promoting further development of the biotech gas-collecting cow backpack methane capture concept and technological system to facilitate capture of ruminant-associated methane due to enteric fermentation.

We encourage CA ARB to procure a full translation of the full report, and evaluate the experimental results in the context of the SLCP Reduction Strategy CEQA analysis currently underway, and also make an English translation of the report available to the public.

We believe that this approach may be one that might potentially meet the requirements of the enteric emissions provision of SB 1383 in the future, though it is possible that more work may need to be done to address the question of economic viability, along with other requirements specified in SB 1383. A more extensive collective infrastructure might (or might not) ultimately be required to make implementation and widespread dissemination of this biotechnological approach a reality. Still, the concept deserves a "good faith" evaluation by CA ARB and an assessment as to what might be needed to establish enhanced viability of this particular biotechnological methane capture approach in the future. [We also note that the technique developed by INTA also captures a substantial amount of rumen-generated carbon dioxide, which could constitute a source gas for future CO2 conversion into ethanol - see <http://www.popularmechanics.com/science/greentech/a23417/convert-co2-into-ethanol/>]."

\*\* I wish to note for the record that the recommendation that ARB investigate the enclosed freestall barn approach for methane capture was first stated (and submitted to ARB) by a large coalition of organizations as far back as June 10, 2015: "By letter dated June 10, 2015, environmental justice and environmental organizations urged the State Board to investigate and include additional control options in the Strategy, including ... (2) enclosed freestall barns and anaerobic digesters vented to biofilter systems to capture and treat methane and volatile organic compound (VOC) emissions without the negative consequence of increased NOx emissions in the San Joaquin Valley. [10] "

[10] Letter from Brent Newell, et al. to Ryan McCarthy and Craig Segall, June 10, 2015

B:

<http://www.publish.csiro.au/an/AN15576>

**The red macroalgae *Asparagopsis taxiformis* is a potent natural antimethanogenic that reduces methane**

# production during *in vitro* fermentation with rumen fluid

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*Animal Production Science* 56(3) 282-289 <https://doi.org/10.1071/AN15576>

Submitted: 14 September 2015 Accepted: 23 November 2015 Published: 9 February 2016

## Abstract

Livestock feed modification is a viable method for reducing methane emissions from ruminant livestock. Ruminant enteric methane is responsible approximately to 10% of greenhouse gas emissions in Australia. Some species of macroalgae have antimethanogenic activity on *in vitro* fermentation. This study used *in vitro* fermentation with rumen inoculum to characterise increasing inclusion rates of the red macroalga *Asparagopsis taxiformis* on enteric methane production and digestive efficiency throughout 72-h fermentations. At dose levels  $\leq 1\%$  of substrate organic matter there was minimal effect on gas and methane production. However, inclusion  $\geq 2\%$  reduced gas and eliminated methane production in the fermentations indicating a minimum inhibitory dose level. There was no negative impact on substrate digestibility for macroalgae inclusion  $\leq 5\%$ , however, a significant reduction was observed with 10% inclusion. Total volatile fatty acids were not significantly affected with 2% inclusion and the acetate levels were reduced in favour of increased propionate and, to a lesser extent, butyrate which increased linearly with increasing dose levels. A barrier to commercialisation of *Asparagopsis* is the mass production of this specific macroalgal biomass at a scale to provide supplementation to livestock. Another area requiring characterisation is the most appropriate method for processing (dehydration) and feeding to livestock in systems with variable feed quality and content. The *in vitro* assessment method used here clearly demonstrated that *Asparagopsis* can inhibit methanogenesis at very low inclusion levels whereas the effect *in vivo* has yet to be confirmed.