Comments received on Methodology for the Reduction of Enteric Methane Emissions from Ruminants through the Use of 100% Natural Feed Supplement

This comment was received via email by the VCS.

Submitted by: Simon König

Organization: Climate Focus and The Tropical Forages Program of the International Center for Tropical Agriculture (CIAT)

Country: United States

1. Page 7, Footnote #1: Please provide full reference, this publication is not listed in Section 10 (References)
2. Page 7, Footnote #1: Please provide an explanation as to why such emission reductions cannot be quantified with this methodology. If peer-reviewed, empirical studies confirm such emission reductions, have derived reliable emission factors, and a project can reliably demonstrate the use of corresponding feeding practices per this methodology, should such emission reductions not be included?
3. Page 7, 2.c.: Please correct spelling to “as per” rather than “as pre”
4. Page 7, 2.d.: What is the justification for the 17% threshold?
5. Page 8, 5.a.: Please explain the choice of the recommended baseline period of “at least one year prior to project implementation”. A longer period may be chosen to determine business-as-usual practices if the farm was engaged in livestock production for a longer period. It should be demonstrated that operations over the baseline period are representative of expected future operations in the absence of the project and that baseline operations have not been significantly altered for the purpose of influencing baseline emissions.
6. Page 8, 5.b.:
    - The meaning of “stratum” and “situation” in this context should be clarified. It is unclear whether it is supposed to refer to typical livestock operations in the country or region in which the operation is to be established and if so, procedures should be outline for the project to reliably demonstrate that the chose “situation” serves as a conservative baseline.
    - If new livestock operations are to be established, it should be demonstrated by the farm that plans for establishing such operations have existed and would have been realized in the baseline scenario. Otherwise, it could be argued that new livestock operations may result in net emission increases relative to the prior land use activity.

7. Page 12, Table 4: Given possible revisions of the IPCC Guidelines, it may be preferable to reference the "latest version" of the IPCC Guidance to reduce the need for making continuous updates to the methodology document. It might be 2006 or a future iteration.
8. Page 14, $ERF_{Enteric}$ Option 2: We assume that emission reductions from any improved feeding practice (e.g. provision of supplemental legume feed) could be accounted for using this method as long as baseline and project EFs can be reliable quantified and feeding practices demonstrated.
9. Page 15, Parameter GE_j:
    - Additional guidance should be provided regarding the data sources and the period over which an average should be derived. Examples of documentation may be given, including feed production or purchase records as well as record of feedstuff provision to animals.
    - Conservativeness of default value 18.45 MJ kg should be demonstrated.
10. Page 19, Parameter $EF_{Productioni,j}$:
    - Purpose of the data indicates calculation of the *baseline* scenario, however *project* emission procedures are described in "Justification of choice of data […]" box. Please clarify.
    - "Justification of choice of data […]" box further refers to a "sufficient number and sampling times" which requires further definition. Sufficient by which standard?
11. Page 22, Monitoring Plan: The same standard should hold for the determination of the baseline scenario, i.e. "project proponents must provide detailed feeding records for each farm"
12. Uncertainty does not seem to be addressed in the methodology. Procedures for calculating (and making deductions from ERs for) uncertainties should be provided.

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This comment was received via email by the VCS.

Submitted by: Patrick Cage

Organization: Greenhouse Gas Management Institute

Country: United States

1) "a. The active ingredients of the feed supplement must be 100% natural plant-based and non-GMO."

   In recent years, studies have shown that particular species of seaweed (macroalgae) have the ability to reduce emissions from enteric fermentation. To clarify that such macroalgae can be used under this methodology, we recommend the text changing the text to state "100% natural plant-based (terrestrial or aquatic) and non-GMO" or "100% natural plant-based (including macroalgae) and non-GMO."

2) "c. The feed supplement must be used as pre product specification provided by the manufacturer. The Specifications provide critical defining conditions to secure the default level of reduction of the enteric methane emissions, such as the feeding routine and dose of supplement per kg of DMI to the animal."

   This should read "must be used as per" product specification.

3) "ERFEnteric Option 1: Apply the default enteric emission reduction factor estimated by the manufacturer of the feed supplement and calculate the emissions using equation 5.5 This option may only be used where the enteric emission reduction factor provided by the manufacturer of the feed supplement is supported by peer reviewed literature or farm-specific emissions data. This information must be provided for review at validation and verification. Additionally, there must be no significant differences in project parameters (e.g., feed regime, geographic region, and management practices) from the manufacturer's supporting documents."

   We believe that the standard used for **ERFEnteric Option 1** is relatively weak and should be specified to ensure environmental integrity in the project activities.

   Although there are examples provided, there are no criteria described for what constitutes "significant differences" between project parameters and the manufacturer's supporting documents. This cedes the determination of significance to the project developer and verifier, which creates a risk of ignoring substantial differences. Given the huge variation in enteric fermentation emission factors for ruminants based on breed, feed, climate, management, and other factors, it is necessary to set out the suite of criteria, the indicators to compare the manufacturer's specifications with the project circumstances, and the acceptable range of variation (including adjustments if required).

   While the text quoted above requires that "Specifications provide critical defining conditions to secure the default level of reduction of the enteric methane emissions, such as feeding routine and dose of supplement per kg of DMI to the animal," it does not specifically name other aspects of husbandry and management that will determine the baseline ruminant emissions, potentially the efficacy of emissions reductions, and ultimately the reduction in emissions as a result of the project activity.

   In addition, the language in the following phrase is in the right direction, but insufficient: "the enteric emission reduction factor provided by the manufacturer of the feed supplement is supported by peer

reviewed literature or farm-specific emissions data." Here, "supported" is ambiguous and overly flexible. The criteria suggested above will help set a higher standard of proof. We suggest replacing "supported" with "established." In particular, this text can be made much stronger by requiring compliance with relevant ISO/ANSI standards.

4) "There would be some small additional upstream emissions in feed supplement manufacture and transport, which are considered negligible in this methodology."

   These feed supplements are rare on the market now and used in relatively small quantities. This is, after all, the justification for using the activity penetration option of the positive list to justify additionality for the project methodology. Because of the few products available, there may be significant transportation miles between the point of feed supplement production and its site of use. The feed supplement per head may also be a significant part of the animal's intake and therefore significant mass. As such, there may be significant associated transportation emissions from the feed supplement compared against baseline feed, which can be sourced more locally. As such, we recommend that the transportation emissions associated with the feed supplement be estimated, or that project developers credibly demonstrate that the transportation emissions are likely to be insignificant using a simplified estimation method.

Comments received on Methodology for the Reduction of Enteric Methane Emissions from Ruminants through the Use of 100% Natural Feed Supplement

This comment was received via email by the VCS.

Submitted by: Laura Wilkinson

Organization: Native Energy

Country: United States

The eligibility requirement that the feed additive be 100% plant based and non-GMO seems to unnecessarily exclude other feed additive types from utilizing this methodology. If there are other eligibility requirements to demonstrate the effectiveness of the feed additive, and a threshold for performance, that should be sufficient, as long as the product is approved by any applicable regulatory body.

Comments received on Methodology for the Reduction of Enteric Methane Emissions from Ruminants through the Use of 100% Natural Feed Supplement

This comment was received via email by the VCS.

Submitted by: Tanushree Bagh

Organization: South Pole

Country: Switzerland

Chapter	Text Passage	Comment
Title	The reduction of enteric methane emissions from ruminants through the use of 100% natural feed supplement	Not all of the animals in *Table 5* are ruminants. This is confusing and in addition the fermentation process is different for each group of animals. Therefore, the *enteric emission reduction factor* might be different and should be measured for each group of animals.
2	This methodology focuses on application of natural plant-based feed supplements, which along with inhibiting methanogenesis, may also have advantageous effects on rumen bacteria, thereby improving fermentation in the rumen.	The chemical process of the methanogenesis requires energy. With a reduced methanogenesis, the animals have more energy at their disposal, which in many cases leads to an increase in milk yield or meat production. Therefore, not only the direct inhibition shall be accountable but also these side-effects if the change can be traced back (shall be part of an in-vivo study) to the application of the feed supplement.
4	1. Livestock producers must feed their animals a natural feed supplement which reduces enteric CH4 emissions by direct inhibition of methanogens in the rumen.	
4	2a. The active ingredients of the feed supplement must be 100% natural plant-based and non-GMO.	The exclusion of non-GMO makes sense. But we suggest to add *nature-identical* ingredients (they are the chemical equivalent of natural ingredients, but chemically synthesized rather than being extracted from source materials) to the list. Otherwise, we will have two identical Methodologies for the same cause in the near future.
4	2d. The application of the feed supplement must demonstrate a minimum enteric CH4 reduction factor of 17% to ensure substantial impact.	There is no scientific reason to have such an arbitrary default value and a substantial impact can be achieved with a 5% reduction as well. It is more important that in addition to the VCS Standard guidelines (4.1.7 and 4.5.6), the effect or the reduction factor has been proven not only by an in-vitro but also by an **in-vivo** study according to *EFSA Guidelines* (or similar) for animal trials and that the results are published in a peer-reviewed paper.

5	Feed supplements that inhibit rumen methanogenesis cannot influence the ratio of enteric methane emissions in exhaled air compared to methane emissions in extracted feces due to the ruminants' physiology.	Reference? The substrate, which has not been converted into methane during digestion, can theoretically lead to increased methane emissions during subsequent manure storage (especially when stored in liquid form) (e.g. Külling et al., 2002). Møller et al. (2014) were able to show that the addition of certain supplements reduces methane emissions from digestion, but at the same time increases the potential for methane emissions from manure management.
8	Emission Reduction Calculation	A scientific measured (in-vivo, according to e.g. EFSA Guidelines and Peer-Reviewed) default *enteric emission reduction factor* needs to be available. Otherwise, the scientific evidence is not given. Based on that, we suggest to simplify the decision tree: Option 1: Performing direct enteric methane measurements to estimate the production per animal group per day. Option 2: Calculation of Baseline Emission according to the newest applicable National Greenhouse Gas Inventory (Tier 1 to 3) for all animal groups. If accurate on-site data for *GE (Gross Energy Intake)* and / or *Ym (Conversion factor)* is available, they can be used instead of the default values used in the *National Greenhouse Gas Inventory* (Option 1).
8	Option 1 calculates the enteric emission factor for each animal group by performing direct enteric methane measurements to estimate the production per animal group per day (enteric emissions production factor). The enteric emissions production factor for each animal group measured by the chosen technology must be available at each validation and verification.	There is some additional information in the Annex, but more specifications on the level of detail is needed. Such as: - time duration of the measurements (to avoid e.g. diurnal, postprandial or seasonal fluctuations) - sample size (how many animals of each group) - 3rd party verification or even a publication should be considered
8	Option 3 is only suitable for animal species listed in Table 6	Wrong Reference. It is *Table 5*.
8	Enteric CH4 emissions factor for each animal in the group j during the monitoring period (country or regional specific factors or Table 6), (kg CH4 head-1 day-1)	
8	Table 5	According to *Equation 4*, the data in *Table 5* has to be converted into values per day. How is this conversion done? If divided by constant (365 days), then seasonal fluctuation is neglected. This is problematic if not a complete year is monitored.
	Table 5	Not all of the animals in *Table 5* are ruminants. The idea of the Methodology is to reduce CH4 emissions from ruminants. *Table 5* should be adapted.


Verified Carbon
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Comments received on Methodology for the Reduction of Enteric Methane Emissions from Ruminants through the Use of 100% Natural Feed Supplement

This comment was received via email by the VCS.

Submitted by: Karen Haugen-Kozyra

Organization: Viresco Solutions

Country: Canada

- **Clause No 1** – the methodology cites an Alberta protocol: "Quantification Protocol" approved by the Alberta Offset System: *Quantification protocol for reducing days on feed for beef cattle".* That is not the correct title and version of the current Alberta Protocol. It should read: "**Quantification protocol for reducing greenhouse gas emissions from fed cattle" (version 3.0), February 2016.**
- **Clause 4.2d** – For a public review, it would be advisable to have some substantiation of why there is a cut-off at 17% emission reductions. Citing a manufacturer's claims on enteric methane emissions reduction as acceptable seems questionable as to the validity of the claim. The validity of the additive needs to be based on peer reviewed science proving the performance of the additive with live animals over a sufficient time period (dosaging, predictability under certain conditions, proof of intake, species, durability of effect over time).
- **Clause 4.3** - This clause eliminates the use of feed supplements that have a similar mode of action and uses the general definition of 'those that do not inhibit methanogensis'. This statement needs to be more detailed in what exactly the mode of action of the supplement is. In other words, the scientific basis of the mode of action (enzyme destabilization; surface area activation (eg. Biochar addition to feed; protozoan immobilization) needs to be firmly described in order to be considered 'complementary' and allowed to be also used under this protocol. Otherwise, remove it and if there is a synergistic effect on enteric methane emissions, then why be concerned about it?
- **General Comment** - As far as I know, Verra bases their methodologies on project-based accounting (WRI GHG Project-Based Protocol or ISO 14064:2. This methodology does not give the reviewer the logic behind the emissions intensity of the feed additive product to ensure the production of this product does not constitute a 'relevant' source of emissions (ISO 14064:2 streamlined life cycle assessment approach) or has significant 'out of project boundary' emissions that need to be taken into account (WRI GHG Project-Based Protocol – so called secondary effects). Natural, plant-based feed additives will need to be grown/processed in significant quantities and it is uncertain what the GHG emissions associated with the growing/processing of these products are. This work needs to be demonstrated.
- **General Comment** – related to the above, focusing only on methane emissions from enteric fermentation, and not potential effects of other gases such as N2O or CO2 isn't sufficient. The protocol should at least demonstrate that they are not affected. To be credible, the process of reviewing controlled, related and affected sources and sinks (ISO 14064:2) for their 'relevance' to the accounting process, or demonstrating that secondary effects outside the project boundary (WRI GHG Project-based Protocol) are minimal or need to have a discount applied is important; even in the production of the feed additive. This needs to be demonstrated to the reviewer.
- **Table 5 – IPCC Tier 1 -** The methodology speaks of ruminants only. The listing of animals in Table 5 includes non-ruminants (horses for example). Since the protocol doesn't speak to having a scientific basis for the testing of the feed additive across other species, I think this is an unjustified

extension to say it can be applied to these species when it has not been through a peer-review publication stage.

- **Clause 9.1, Page 15** – re-check the GEI equation. I think GE is multiplied by DMI not divided by. Also, As per the Alberta Protocol, if added lipids are fed, the fat content of the diet is altered to suppress enteric methane, a higher energy density figure can be used (refer to the Alberta protocol for the value of a 'safe' lipid content of the diet (19.10 MJ kg-1).

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This comment was received via email by the VCS.

Submitted by: Dr. Jacqueline Gehrig-Fasel

Organization: TREES Consulting

Country: Switzerland

Methodology Section	Paragraph	Page	Topic	Question / Comment
Summary		5	"…applying empirically-derived regional emission reduction factor provided by the supplement manufacturer…"	What scientific evidence is required for accuracy / applicability of the emission factors provided by the manufacturer? Are other sources also applicable (e.g. scientific research results not provided by the supplement manufacturer?
4. Applicability Conditions	2a	7	"…100% natural plant-based and non-GMO."	What is the reason for this requirement? There does not appear to be a content-based rationale behind this in the methodology. Consequently, more detailed specification and rationale is needed for "100% natural planted-based". E.g. does this include chemically extracted components of plants? What about nature identical substances?
4. Applicability Conditions	2b	7	.."must have no negative health impacts on the animal to which it is fed."	What proof is required that the supplement does not lead to any negative health impact to animals? What about to impact on humans when using the animal products (e.g. milk, meat)?
4. Applicability Conditions	2c	7	"…pre product specification…"	typo? "per" instead of "pre"
4. Applicability Conditions	2c	7	"…such as the feeding routine and dose of supplement per kg of DMI to the animal."	Are these just examples? Some substances will vary in effect depending on feed composition (e.g. NDF) and thus require tracking of more information on feed composition.

4. Applicability Conditions	2d	7	"…factor of 17%..."	What is the rationale for this threshold? No background (scientific or other) is provided for this very specific number. Also, maintaining this requirement would prevent project activities with lower reduction factors - which for example could be low-cost options which could be applied when funds are limited.
4. Applicability Conditions	5a	8	"…for a minimum of one year."	Animal feeding practices are known to vary significantly between years (e.g. changes in feed availability due to weather events or market changes). What are the conditions / reasoning for limiting the baseline to one year? What safeguards are in place to ensure that baseline does consider variations, respectively does not represent a biased event?
4. Applicability Conditions	4	8	.."project proponent must be able to trace the feed supplement from on-farm consumption"	More specific information may be needed here. E.g. how would one ensure that each animal receives the necessary amount of supplement in less controlled (non-TMR/PMR) dairy systems such as are common in developing countries? Are there options for management systems where animals roam and graze over a large area and do not receive dietary supplements? Consumption of feed supplement per animal should be listed in the monitoring plan.
5. Project Boudary	first paragraph	8	"…there is no change in such activities due to the project."	How is this ensured (e.g. no change in feed composition and sources to increase impact of feed supplement)?
5. Project Boudary	first paragraph	8	"…emissions in feed supplement manufacture and transport, which are considered negligible in this methodology."	What evidence is required to prove negligibility? In some cases, growing and harvesting, processing and transport of the natural components for the supplement production could be considerable. Transparency on emissions from production and transport should be provided.
5. Project Boudary	Table 3	8 and 9	N2O emissions	Certain supplements may have an impact on manure composition and thus N2O emissions. Methodology developer needs to provide an approach to account for N2O emissions which could be omitted if it can be proven that there is no effect for a specific supplement.

7. Additionality	Step 2	9	Positive list / activity penetration	1) According to VCS Standard, new products which have not yet been available on the commercial market in the project region cannot directly apply positive list approach A but must instead perform a barrier analysis. Also applying the positive list to the entire world without further restrictions seams unjustified. 2) MAP is likely less than 3.6bn ruminants as no product will be available for all cattle owners worldwide. Some key factors likely reducing MAP are a) animal access for supplement provision (e.g. range fed animals will not be accessible to feed supplements in a controlled fashion), b) maximum production, storage and transport capacity, c) distribution to rural environments will likely be limited.
8. Quantification…	Figure 1	10	Decision tree	Options should be described for easier comprehension of the decision tree.
8. Quantification…	Figure 1	10	Decision tree	If different options are used for baseline and project assessment, it must be ensured that emission reduction are calculated conservatively (due to the high uncertainty for Option 2/3 values). This is especially true if default values (Option 2/3) are applied in the project scenario while referencing a measured baseline. How is conservativeness ensured in the methodology?
8.1 Baseline Emissions	Eq. 2ff	11	Number of animals	Number of days for each animal in group j is unclear, as this would have to be either an average, if formula 2 is applied, or a total of days (sum over days per cow) in a formula without Ni,j number of animals.
8.1 Baseline Emissions	Eq.3	11f	Option 2: Conversion factor (Ym)	Default IPCC conversion factors are applied per animal category. These factors have been shown to be imprecise and not suitable for project-level application due to dependencies on various factors (e.g. feed composition, climate,…) and errors up to 30% (IPCC 2006 Vol 4 Ch 10, Table 10.12 and 10.13). Methodology indicates dependency on "quality of feed" ("high digestibility and energy value") but does not further specify classification.

8.1 Baseline Emissions	Eq.4	12f	Default emission factors	High-level default IPCC conversion factors are applied per animal category. These are per-head EFs not not suitable for conservative project-level application due to high errors (+- 30-50%, according to IPCC 2006 Vol 4 Ch 10, Table 10.10).
8.2 Project Emissions	Eq. 5	13	Number of animals	The proposed equation does not take into account differences in animal count between Baseline and Project (or at least does not explicitly state that "BEEnterici" would have to be calculated with project herd structure and animal counts). If unchanged number of animals is presumed, a respective applicability condition should be added. However, as such herd fluctuations are very common, an approach to account for change in animal numbers should be added.
8.1 Baseline Emissions	Table 5	13	Horse, mule/ass, swine, poultry	Horse, donkey (mule, ass), swine, and poultry are not ruminants: remove from table as the methodology is limited to ruminants only.
8.2 Project emissions	Eq.6	14	emission factors (defaults)	Defaults per group (EFEnterici,j) need to be calculated with correct number of animals (project scenario) in each group. This is not specified explicitly (just that the baseline equations should be used).
8.2 Project emissions		15	Supplement production and transport	Emissions from production and transportation of the supplement are missing. The project level assessment of transportation of feed supplement, where applicable, shall be included in project boundary. Also, depending on the ingredients used for the supplement, significant emissions might arise from growth and harvest. Instead of general exclusion of these emission sources, they should be generally included (unless otherwise shown).
8.3 Leakage		15	Activity shift due to potential change in milk production	No consideration of decreasing emissions due to decreasing production (i.e. leakage), as supplements may have impacts on (milk) production, thus making it necessary to consider leakage from activity shift.
9.1 Data and Parameters Available at Validation	First Table	15	Parameter GEj	Equation error: Should be GEj = DMIj*Energy Density

General				Current loose approaches (e.g. no proof of effects of feed supplement trough in-vivo trials) require very deep knowledge of VVB / auditor to assess applicability and conservativeness of parameters applied. This could become a liability for VCS as VVBs may not have specialists with animal nutrition and calculations and experience.
General			GHG scope	No emission accounting from manure is provided. Inclusion of manure in feed-related methodologies is common practice, e.g. in the Alberta protocol, or the Gold Standard feed additive methodology "Reducing Methane Emissions from Enteric Fermentation in Dairy Cows through Application of Feed Supplements". Manure emissions are tracked in these methodologies to assess potential changes due to the project activity (increase or decrease), i.e. as a consequence of feeding a supplement or changing feed. How can the methodology developer be sure that any supplement feed by anyone does not have an effect on manure?
General				Default IPCC values cited refer to IPCC 2006 specifically. It is known that many IPCC 2006 default values have high errors (see comments above) and should thus not be applied. New IPCC values are expected this spring. It should thus be recommended to apply the newest IPCC values available (but only if errors of default values are in an acceptable range as required by the VCS standard).