FARM ES Version 2.0 to Version 3.0 Comparison

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INTRODUCTION

FARM Environmental Stewardship Version 3.0 uses the Ruminant Farm Systems (RuFaS) model, whereas FARM Environmental Stewardship Version 2.0 used a model described in Asselin-Balençon et al. (2013).

RuFaS is a process-based model wherein biological, physical, and chemical cycles are modeled for the whole-farm system on a daily timestep in order to generate the results. The farm's location is used to pull in relevant soil, temperature, and precipitation data.

The model used in FARM ES Version 2.0 is a peer-reviewed, empirical model that uses IPCC Tier 2 methods and life cycle assessment (LCA) research.

Between the release of Version 2.0 and Version 3.0, there were several key developments in GHG measurement and accounting:

- The IDF Carbon Footprint standard was updated (2015 to 2022)
- IPCC released a 2019 refinement of its 2006 guidelines for GHG reporting
- IPCC released its sixth assessment report, with updated global warming potential values
- The GHG Protocol drafted the Land Sector and Removals Guidance
- The Science Based Targets initiative was founded and established its methods for corporate goal setting

Additionally, there were continued developments in the scientific understanding of various sources of emissions from dairy farms.

NMPF and DMI collaborated to update FARM Environmental Stewardship in order to update to the latest science, address some of the changes in GHG accounting methodologies, and to provide dairy farmers with a more robust tool offering better insights.

This document summarizes the key scientific differences and similarities between Version 2.0 and Version 3.0 to support interpretation of the results and aggregate reporting.

KEY SIMILARITIES

Scope	Cradle to farmgate
Unit of Results	Lb CO2e / lb FPCM FPCM calculated in accordance with the IDF Carbon Footprint Guidance.
Applicability	Dairy farms of any size, geography, and production style.
Fees	Free to use for dairy farms, cooperatives, and processors.
Scope 3 Reporting	Suitable for Scope 3 reporting; aligned with the existing GHG Protocol Scope 3 standards.

KEY DIFFERENCES

	Version 2	**Version 3**
Model Type	Uses an empirical model based on IPCC Tier 2 and defaults from a nationwide LCA. Appropriate for establishing inventory; limited usability for strategy and decision making.	RuFaS simulates every individual animal on a daily timestep over a 3-year period to generate the results. Uses a process-based model that simulates a whole-farm system, primarily using IPCC Tier 3. Being process-based means it can be used for strategy / decision making (scenario analysis).
GWP	AR4	AR6 except for feed production emissions, which are in AR5.
IPCC approach	Mostly IPCC Tier 2	Mostly IPCC Tier 3
Allocation of beef / milk	IDF 2015 equation	IDF 2020 equation
Carbon Sequestration	Excluded; assumed steady.	Embedded within the purchased feed emissions factors. Quantifiable in homegrown feed emission.
LUC	Excluded	Included in purchased feed emissions factors and separated out within the results report
Ration	11 feed types.	List of 100+ feed ingredients.

Purchased Feed Emissions	At regional level (5 regions). From LCA published in 2013 with updates in 2020.	At county level for feeds making up the majority of dairy rations, sourced from the Foos3 model that takes into account transportation. Byproduct feed emissions factors from recent LCA commissioned by DMI. Remaining feeds from IPCC at national scale.

MODEL DOCUMENTATION

For FARM ES Version 2, please see model described in Asselin-Balençon et al. (2013).

For FARM ES Version 3, please refer to the FARM ES Version 3 Model Documentation on the FARM Program website: https://nationaldairyfarm.com/producer-resources/environment/.

COMPARABILITY

The underlying model is significantly different from Version 2 to Version 3. Results should not be directly compared.

FARM is planning on offering the ability to rerun Version 2 data through the Version 3 model. This effort will require making reasonable assumptions about the data inputs that differ between the versions (i.e. data inputs that were not collected in Version 2 but are required to run Version 3). As such, the re-run will enable continuity in GHG inventory management overall but should not be relied upon as perfectly capturing the GHG footprint at the individual farm level for Version 2 evaluations re-run through Version 3.