



ENVIRONMENTAL STEWARDSHIP EVALUATOR POCKET GUIDE

Version 2
2020-2024

CONTENTS

BIOSECURITY MEASURES

CONTINUOUS IMPROVEMENT OPPORTUNITIES

PRODUCTION

ENERGY

FEED

MANURE

NUTRIENT MANAGEMENT PLAN

INTERPRETING RESULTS



BIOSECURITY MEASURES

Biosecurity Best Management Practices During an On-Farm Environmental Stewardship (ES) Evaluation

- Follow reasonable biosecurity procedures requested by farmer
- Park your vehicle in as clean of an area as possible
- Wear disposable plastic boots or rubber boots
 - Put on before leaving the vehicle
 - Effectively sanitize rubber boots before/upon entering milk house
 - After evaluation, wash manure off plastic boots/rubber boots to prevent tracking of manure into vehicle
 - Effectively sanitize boots, equipment, etc. as necessary
- Wear clean clothes
 - When visiting multiple farms, bring disposable coveralls or a change of clothes
- Limit touching of livestock
- Wearing gloves is recommended

If conducting Animal Care and Environmental Stewardship evaluations simultaneously, remember to also organize the evaluation from clean to dirty, young to old, and healthy to sick.

CONTINUOUS IMPROVEMENT OPPORTUNITIES

Goals of a FARM ES Evaluation

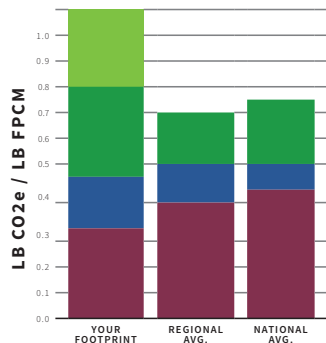
- Review greenhouse gas (GHG) and energy footprint results.
- Discuss continuous improvement opportunities with farm management.
- Connect interested farmers with subject matter experts and local or state resources.

Definitions

“On-site” and “on-farm” refer to dairy activities on the farm.

If a farm has multiple facilities that are co-located or within ~10 miles of one another, evaluators can do one evaluation for the farm as a whole. Enter the data into one of the facility accounts. However, if the facilities are in different states, we recommend two separate evaluations.

FIGURE 1: YOUR FARM GHG EMISSIONS



FARM ES Evaluation Results

The FARM Environmental Stewardship Program estimates the farm’s GHG and energy use footprints. The total GHG footprint is divided based on where the emissions come from:

- Feed production
 - Benchmarks for feed production emissions are not available in FARM Environmental Stewardship Version 2.
- On-site enteric (emissions from the cow’s digestive processes)
- On-site manure
- On-site energy use
 - The energy results are divided into feed production and on-site energy.

ON-SITE RENEWABLE ENERGY	ON-SITE NON-RENEWABLE ENERGY
On-Site renewable includes digester electricity / heat, solar, or wind.	On-site non-renewable is everything else. It does not capture grid electricity from renewable sources. We hope to reflect grid electricity renewable mix when we update the electricity factors in the future.

Results are compared to regional and national averages from the industry’s life cycle assessment (LCA) research.

PRODUCTION

Herd Profile

Heifers and Heifer Calves

Record the running herd average of replacement animals, not the annual total. This can be considered similar to the 'herd size' for calves and heifers.

- For example, if in any given month there are 20 calves present on the farm on average, enter the running average of 20 heifer calves.

ON-FARM	OFF-FARM
Calves and heifers raised on the farm where the milk production is occurring.	Calves and heifers raised elsewhere, such as at a neighbor's farm down the road or another operation many miles away.

Lactating and Dry Cows

Record the running herd average, not the annual total.

- For seasonal herds, report the average fraction of a consistent year that the herd is dry. For example, if the herd is dry for 45 days per year, enter 45/365 or 12.3 percent.

Milk Production

If only crude protein is available for the average milk protein content (%), subtract 0.19% to estimate the true protein percent.

Beef Production

Discuss records on mature cows culled for beef and calves sold for beef production.

Mature Cows

For Annual Number Culled for Beef, EXCLUDE:

- ✗ cows that die of natural causes or are otherwise euthanized
- ✗ cows sold to other farms for additional production

Calves

For Annual Number Sold for Beef, EXCLUDE:

- ✗ calves sold as replacement animals to other dairies

If a farm is raising all their bull calves and heifers sired by beef semen to finishing, the farm should make a judgment call on when those animals leave the 'dairy' side of the business and enter the 'beef' side of the business. A good arbitrary cutoff is weaning; include calves being raised for beef on-site until they are weaned. At the point of weaning, consider them 'sold' by the dairy and include the number and average weight per cow (lbs) in the evaluation.

ENERGY

Utility bills may be useful for determining electricity and natural gas usage. Information on other fuels may be found in purchase records or usage logs. The farm's accountant may separate out dairy versus non-dairy energy expenditures.

If you only know dollars spent on energy:

Use the average price per kWh of electricity or price per gallon of fuel to estimate the total usage.

For example, if the average price of electricity is \$0.12 per kWh and the farm's expenditure for a 12-month period was \$48,000 then:

$\$48,000 / 0.12 = 400,000$ kWh use by the farm.

Other methods to estimate energy use can include:

- Taking data from another dairy of similar size and geography
- Using prior year data if the dairy has not expanded or contracted

Write down the approach used to estimate energy use in the notes field.

Do NOT include in the evaluation:

Exclude activities associated with crop production, non-dairy enterprises, or residences.

- ✗ **Hauling**
- ✗ **Non-dairy enterprises on the farm**
- ✗ **Crop production activities** (e.g., irrigation, tillage, planting, harvest, grain drying)
- ✗ **Home energy use** (electricity, heating, etc.)

Include in the evaluation:

Any activities associated with the dairy operation.

- ✓ **Dairy parlor use** (milking, cleaning, compressors, pumps, etc.)
- ✓ **Lighting**
- ✓ **Fans**
- ✓ **Feed conveyance / machinery** (grinding, mixing, etc.)
- ✓ **Manure management, except spreading**
- ✓ **Heating/water heating when used for dairy activities**
- ✓ **Transporting heifers or cows**
- ✓ **Vehicle use for other dairy management activities**
- ✓ **Other dairy activities**

Electricity Total Annual On-Farm Use (kWh)

Total annual on-farm electricity purchased. Exclude renewable energy used from on-site solar, on-site wind or on-site anaerobic digester. If you participate in net metering, input the total electricity consumed from your annual summary – do not enter the ‘net’ electricity.

Natural Gas Conversion

1 Therm = 1 CCF = 100 cubic feet

Notes

FEED

Pasture

If only a portion of the cows in each group are on pasture, adjust the response to one of the time questions to reflect that scenario.

For example, if 25% of the dry cows are on pasture for 15 weeks per year, enter $0.25 \times 15 = 3.75$ weeks/year.

Lactating Cow Dry Matter Intake and Ration Make-up

Report the ration and feed figures as the daily average intake per head of lactating cows during the consistent year/12-month period used throughout the evaluation.

- May need to average the values across varying rations to determine a single average for the entire lactating herd as well as convert from an as-fed basis to a dry matter basis.
- Ration data may also be available in the operation’s dairy management software system or in written records.

Lactating Cow Dry Matter Intake and Ration Make-up (Cont'd)

Example table

Ration	DMI (lbs/day)	Average Days in Ration	Total Lactating Days	Time- Weighted DMI (lbs/day)	Total DMI	Ration Time- Weighted DMI
High	60	X 100	/ 300	= 20	50	20/50
Low	45	X 200	/ 300	= 30		30/50

“High” ration contains **25%** corn grain; “Low” ration contains **10%** corn grain
25% x (20/50) + 10% x (30/50) = 16% corn grain

Report the percent make-up, on a dry matter basis, of ingredients in the average lactating cow ration. If the farm uses ingredients that are not listed, then enter this information in the ‘all other feed’ category. Here is a chart of “proxy” choices:

FEED INGREDIENT	FARM ES PROXY
Earlage	Corn silage
High-moisture corn	Corn grain
Rye hay	Grass hay
Rye silage	Grass silage
Snaplage	Corn silage
Sorghum sudan	Other
Soybean hulls	Other

*Record any proxy choices in the notes field for future reference.

Use this table (also featured in the FARM Environmental Stewardship Program User Guide) to convert from an as-fed basis to a dry matter basis. Ration percentages must total 100%.

Feed Ingredient	As-Fed (lbs/day)	Average % Dry Matter Content	Dry Matter Intake (lbs/day)	Ingredient % of Total DMI (dry matter basis)
Corn Grain (incl. cracked, ground, and steam-flaked)		X 85%	=	
Corn silage		X 35%	=	
Wet DGS		X 40%	=	
Dry DGS		X 91%	=	
Soybean (raw or roasted)		X 91%	=	
Soybean meal		X 89%	=	
Alfalfa hay		X 84%	=	
Alfalfa silage		X 39%	=	
Grass hay		X 84%	=	
Grass silage		X 35%	=	
Pasture		X 20%	=	
All other feed		X 85%	=	

Crop Production

SELF-PRODUCED	PURCHASED
Any crop production where the dairy operation has operational control over crop production decisions. <i>For example, crop production happening on the dairy itself, or on a related LLC or entity that the dairy owner has part-ownership.</i>	The dairy does not have any operational control. <i>For example, grain or forage purchased from a neighbor.</i>

Notes

MANURE

Include all manure management for the entire dairy operation, including the lactating cows, dry cows, heifers and calves.

Manure Allocation

If the fraction of manure handled by each system is not known, one option is to use the time spent in various farm areas as a proxy for manure distribution. For example, consider a case where manure from the milking parlor is sent into a slurry and manure from the freestall barn is flushed into an anaerobic lagoon. If each lactating cow spends about three (3) hours per day in the milking parlor and 21 hours per day in the freestalls, then about 3/24 or 13 percent of manure goes to the slurry and 21/24 or 87 percent goes to the anaerobic lagoon.

If assumptions are made to estimate the fraction of manure going to each system, record those in the notes section for use in subsequent years.

Aerobic Treatment



With forced aeration: Liquid handling with the addition of oxygen through forced aeration.

With natural aeration: Liquid handling with the addition of oxygen through natural aeration, such as facultative ponds and wetland systems that rely on photosynthesis.

Anaerobic Digester



Encourages the bacterial decomposition of manure in the absence of oxygen, producing biogas, which is collected and utilized or flared.

Composting



In-vessel or static: In-vessel is typically in an enclosed channel, with forced aeration and continuous mixing. Static is in piles with forced aeration but no mixing.

Intensive with forced aeration: Composting in windrows with regular (daily, two to three times per week, or weekly depending on stage) turning for mixing and aeration.

Natural aeration: Composting in windrows with infrequent turning for mixing and aeration, often with installed pipes for passive aeration (no blower or other forced air).

Anaerobic Lagoon



Covered: Lagoons combine waste stabilization, treatment and storage. Water is added. Solids volume is typically less than 5%.

Uncovered: Lagoons combine waste stabilization, treatment and storage. Water is added, for example if the manure is flushed out of the barns or if water is added to vacuum it.

Solids volume is typically less than 5%. Uncovered lagoons are open to the ambient air.

Daily Spread



Manure is collected and land applied within 24 hours.

Deep Bedding



Less than one month: Bedding is continually added to absorb moisture over a production cycle LESS THAN one month (a.k.a. bedded pack).

Greater than one month: Bedding is continually added to absorb moisture over a production cycle GREATER THAN one month (a.k.a. bedded pack).

Dry Lot

A paved or unpaved open confinement area without any significant vegetative cover where accumulating manure may be removed periodically.



Liquid / Slurry



With natural crust: Often in earthen structures, basins or tanks. Slurry is usually between 5-15% dry matter. There is little added water. A natural crust is allowed to form.

Without natural crust: Often in earthen structures, basins or tanks. Slurry is usually between 5-15% dry matter.

The only water added is rainwater or wash water, but not flush water. A natural crust is NOT allowed to form.

Pit Storage



Less than one month: Usually with little or no added water, collected below a slatted floor, with storage LESS THAN one month.

Greater than one month: Usually with little or no added water, collected below a slatted floor, with storage GREATER THAN one month.

Solid Storage



Storage of manure, often for several months, in unconfined piles or stacks.

Solid-Liquid Separation



Processing technology that partially separates the solids from liquid manure using gravity or mechanical systems.

If the farm has more than two (2) uses for manure solids after solid-liquid separation, focus on the management systems where the manure spends the most 'time' of the year.

Separation Efficiency

Separation efficiency varies greatly based on many factors, such as separator type and design, manure consistency, total solids content and flow rates. Reach out to the manufacturer for more information. Suggested values for separation efficiency:

Screw pass	25% to 45%
Centrifuge	50% to 61%
Stationary screens	15% to 50%
Rotating screens	1% to 14%
Belt press	30% to 50%
Roller press	10% to 40%

Manure Management System Proxies

MANURE MANAGEMENT SYSTEM	FARM ES PROXY	REASONING
Compost barns	Deep bedding with storage > 1 month	Deep bedding with storage > 1 month is a proxy for a compost barn system within FARM ES today. The model does not list 'compost barn' as an option due to insufficient research available on the GHG emissions from compost barn systems.
Manure solids used as bedding	Solid storage	Manure solids used as bedding should be categorized as "solid storage" in FARM ES, not as "deep bedding".

NUTRIENT MANAGEMENT PLAN

A Nutrient Management Plan includes any of the following:

1) Nutrient Management Plan (NMP)

The most common; generally applicable to most size dairies above a certain threshold.

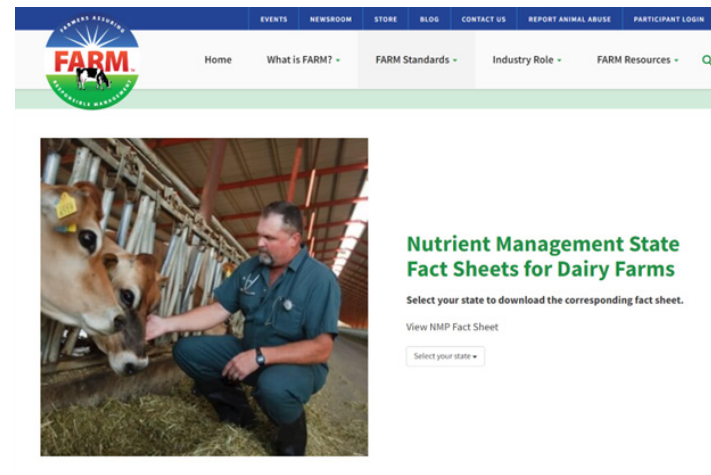
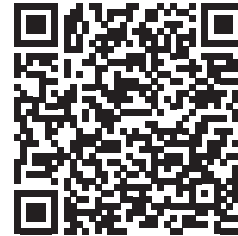
2) Comprehensive Nutrient Management Plan (CNMP)

Generally, CNMPs apply to CAFOs though some smaller farms need one depending on how they handle manure.

3) Manure Management Plan (MMP)

Some states have manure management plans and others do not. For the purpose of FARM ES, MMPs count as an NMP because they deal with manure handling and nutrient issues.

Visit the FARM ES webpage to download NMP Fact Sheets for each state.



INTERPRETING RESULTS


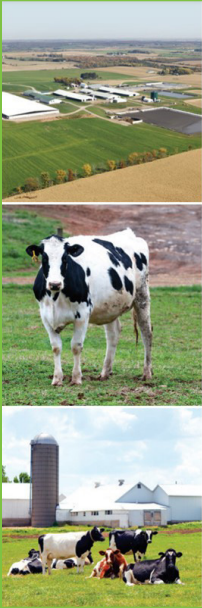
Subject Matter Experts

- **On-site enteric:** The farm's nutritionist, veterinarian and other herd health specialists. Feed manufacturers may offer additional expertise.
- **On-site manure:** The farm's local extension offices, certified agronomists, engineers and other consultants.
 - Newtrient advances technologies that transform manure into products like soil conditioners, fertilizer and energy. To learn more, visit Newtrient.com
- **On-site energy use:** The farm's utility company may offer low-cost energy audits.
- **Feed production:** The farm's local extension or Natural Resources Conservation Service (NRCS) office.
 - Field to Market maintains a calculator farmers can use to measure the environmental footprint of their unique fields and production practices at fieldtomarket.org
 - FARM ES will be expanded in Version 3 to measure the footprint of farm's unique field practices.

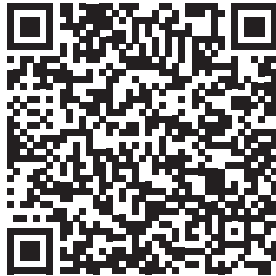
EMISSIONS TYPE	REFERENCE MANUAL CHAPTER(S)	CHAPTER PAGE	EXAMPLE TOPIC AREAS COVERED
All	Ch. 2: Moving Forward	Page 8	<ul style="list-style-type: none"> • Selecting a specialist/vendor • Financing options
Feed Production	Not covered in the Reference Manual		
On-Site Enteric	Ch. 3: Feed Ch. 4: Productivity	Page 16 Page 38	<ul style="list-style-type: none"> • Ration formulation • Feeding • Herd health
On-Site Fuel Use	Ch. 6: Energy	Page 72	<ul style="list-style-type: none"> • Energy efficiency options for milking, ventilation and lighting
On-Site Manure	Ch. 3: Feed Ch. 5: Manure	Page 16 Page 58	<ul style="list-style-type: none"> • Manure storage and treatment options • Ration formulation

After completing the FARM Environmental Stewardship evaluation, you may identify areas where the farm's emissions are higher than the regional or national average. Consult the relevant chapter(s) of the FARM Environmental Stewardship Continuous Improvement Reference Manual to find practice and management considerations to reduce emissions in those areas.

NOTES & RESOURCES



Environmental Stewardship
Version 2.0 User Guide



Scan here
for a PDF of
the FARM ES
User Guide

Notes



Learn More

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FARM Database

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