



NEF Farm model workshop
22-23 August 2016



Outline Dairy production

- Current provisions in
 - Product Environmental Footprint Category Rules (PEFCR)
 - Cow Model Working Group (CMWG) **DRAFT** document
- (Other cross-cutting documents and issues: PEFCR feed, FAO crop production)
- Examples of existing models
- Synthesis interviews dairy companies

What does the dairy PEFCR say about the data on farm level?

- Raw milk production is defined as one so called "Most relevant life cycle stages"
- Feed production (on- and off-farm), enteric fermentation and manure storage are defined as "Most relevant processes"
- Data requirements:
 - primary (data that shall be collected specifically by each company)or
 - semi-specific (for which default values are proposed but company can replace it by better ones if they have it) if justified.

Data Needs Matrix (DNM) in the dairy processors perspective

		Most relevant process	Other process
Situation 1 Process run by the company applying the PEFCR	Opt 1	Provide company-specific data (as requested in the PEFCR) and create a company-specific dataset partially disaggregated at least at level 1 (DQR ≤1.6)	Provide company-specific data (as requested in the PEFCR) and create a company-specific dataset partially disaggregated at least at level 1 (DQR ≤1.6)
	Opt 2		Use default secondary dataset, in aggregated form (DQR ≤3.0)
Situation 2 Process <u>not</u> run by the company applying the PEFCR but with possibility to have access to company-specific information	Opt 1	Provide company-specific data (as requested in the PEFCR) and create a company-specific dataset partially disaggregated at least at level 1 (DQR ≤1.6)	Use default secondary dataset, in aggregated form (DQR ≤4.0)
	Opt 2	Starting from the default secondary dataset provided in the PEFCR, use company-specific activity data for transport (distance), and substitute sub-processes for electricity mix and transport with supply-chain specific PEF compliant datasets. The newly created dataset shall have a DQR ≤3.0.	
Situation 3 Process <u>not</u> run by the company applying the PEFCR and <u>without</u> possibility to have access to company-specific information	Opt 1	Use default secondary dataset, in aggregated form (DQR ≤3.0)	

What environmental impact are to be calculated with this data?

Final products

- Climate change
- Water resource depletion
- Freshwater eutrophication
- Marine eutrophication
- Terrestrial eutrophication
- Freshwater ecotoxicity
- Land use
- Acidification

For communication purposes
as minimum

Intermediate products: all 15 impact categories included in the PEF guidance document

Data needed also for Additional information on dairy products

When raw milk is part of the foreground system

- Biodiversity as
 - Share of grass from pasture in the feed ration (% of dry matter intake, DMI)
 - Semi-natural habitats (% of the dairy farm area)
 - Share of feed with possible risk of deforestation * in its supply chain within the feed ration (% of DMI)
 - Schemes (certified or not) in the raw milk supply chain with a description of relevance
- Land use change and deforestation as
 - Land use change related CO₂ emissions
- (when sufficient information is available) Carbon sequestration and release (i.e. land use effects)

* non-certified soybean from Brazil and Argentina, non-certified palmmeal from southeast Asia

PEFCR dairy: foreground specific data collection

“Raw milk used in dairy products generally comes from multiple dairy farms. A representative sample of farms in the supply chain should be defined, in a way that properly represents the variability of the dairy systems. Main aspects influencing such variability, and which should be taken considered when defining the samples, are:

- Breed;
- Feed supply and rations;
- Average milk production per cow;
- Grazing vs non-grazing systems;
- Manure management systems.

Given seasonal variability, all data should be collected for a minimum of 1 year of exploitation of each dairy farm. Average data collected over 4+ years is preferable, when available.”



DQR guidance raw milk production modelled with primary data

Quality rating	Time representativeness	Technological representativeness	Geographical representativeness
1	Production average over 2+ years, in the previous 5 years, with respect to 2016	Sample of farms representing >80% of total supply chain	All areas in supply chain
2	Production average over 2+ years, in the previous 10 years, with respect to 2016	Sample of farms representing 60-79% of total supply chain	Selected areas representing >50% of supply chain
3	Production average for a single year, in the previous 5 years, with respect to 2016	Sample of farms representing 40-59% of total supply chain	Single area representing 30-49% of supply chain
4	Production data for a single year, in the previous 10 years, with respect to 2016	Sample of farms representing 20-39% of total supply chain	Single area representing <30% of supply chain
5	Production data for a an unknown period or a period lower than 1 year	Single farm or sample of farms representing <20% of total supply chain	Unknown or proxy

PEFCR dairy: background generic data

“In cases where primary data for raw milk cannot be used, semi-specific datasets can be used in PEF studies of dairy products, following the guidance below:

Step 1: Identification of dairy systems relevant to the supply chain [...]. The different dairy systems available from the PEF/OEF LCI database shall be used:

- Grazing (excl organic), production mix
- Mixed systems (excl organic), production mix
- Non-grazing (excl organic), production mix
- Organic, production mix

Step 2: Use of national average. [...] The PEF/OEF LCI database provides secondary data for the main dairy processors in the EU: Fr, NL, It, D, UK. National datasets from other commercial LCI datasets can be used provided.

Step 3: Use of EU 28 average. [...] EU-28+EFTA secondary datasets from the PEF/OEF LCI database shall be used as placeholder.”

Cow Model Working Group

- To ensure consistency in the modelling of cattle in several pilots (dairy, meat, leather, feed and pet food)
- Draft deliverable December 2014
- Representatives from the pilots above, JRC, DG ENV, FAO and invited experts
- No consensus on allocation on farm level - JRC (on mandate of DG ENV) to decide
- Other aspects: consensus within the CMWG or in combination of pilots

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- Allocation within the farm module
 - Milk, live adult animals, calves: IDF 2010 (biophysical allocation)
 - Dead animals: waste – EoL formula
 - Manure: Three alternatives
 - Residual (default) – emissions allocated to products up to farm gate
 - Co-product (to be tested) – upstream emissions economic allocation manure/milk/live animals at farm gate; remaining emissions IDF 2010 biophysical milk/live animals
 - Waste - EoL formula
- If anaerobic digestion: residual + allocation heat/electricity + other provisions

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- Enteric fermentation IPCC Tier 2 or 3
- Emissions from manure mgmt
 - Methane IPCC Tier 2 or 3
 - Direct N₂O IPCC Tier 1, 2 or 3
 - Indirect N₂O IPCC Tier 1, 2 or 3
 - NH₃ EMEP/EEA Tier 2 or 3
 - NO_x EMEP/EEA Tier 2 or 3
 - NMVOCs EMEP/EEA Tier 2 or 3
 - Particulate matter EMEP/EEA Tier 2 or 3
- Carbon sequestration/release in grassland systems
 - Not included in PEF IC "Climate change" unless < 20 years
 - May be included in "Additional information" using IPCC Tier 1 or 2*

* Tier 2 approach in annex: A) Permanent grassland B) Temporary grassland

FAO/LEAP Environmental Performance of animal feeds supply chains

Guideline for allocation in the feed production life cycle

- 1) Allocation at farms and factories
- 2) Allocation procedures for transport
- 3) Allocation procedures for manure application

How to get this data?

How to get data on

- feed production
- enteric fermentation
- manure storage

for all these impact categories with required data quality?

How to get info on the indicators above (biodiversity, LUC)? Are they the relevant ones for biodiversity for our production situations? Multi-year crops as leys – how to account for these services? Semi-natural pasture – same question.

Examples of available models

- **VERA (SE):** Swedish Board of Agriculture and "Greppa Näringen" (advisory org. Focused on plant nutrient aspects)
Plant nutrient balances on farm-level, CF as well. Cradle-to-farmgate. Does not provide product related CF's or eutrophication. No plant protection, but this might be incorporated later. Could probably be used for PEF, but requires dedicated efforts to adjust how input data is managed (to get the product specific results). Climate change, Acidification, eutrophication. Land use, P-use can be calculated, not toxicity and biodiversity.
- **CANTogether (FP7 project, not public):**
Excel-tool for quantification of emissions. A useful generic tool for enteric fermentation and manure related emissions, only climate (+N-emissions to air, NH3)
- **SENSE-tool (FP7 project, on-line open source):**
Product-based results, all relevant impact categories included (check!), EF's for inputs from EcoInvent database
- **Arla CF tool (company model)**
Calculates the carbon footprint at farm level, functional unit is 1 kg energy corrected milk (ECM), or at national level, also allowing for comparison between countries , or at corporate level

Interviews with four dairy companies

- No company have access to data directly. The farmers have much data, but not according to PEF-standards, work is needed to adjust.
- Arla Foods are working continuously with climate checks on farms. Advisory services do much of the on-the-ground work. Public database on farm performance on plant nutrients (DK), Private database (Greppa Näringen, SE)
- Several company had suppliers that does not collect/report relevant data. A significant effort is needed to get representative data
- Representativeness is complicated. Companies source over large areas with varying conditions for dairy farming (climate, soils etc). Multi-year is demanding
- Customers are asking for EF's (not PEFs though)
- A general concern that data requests can be to strict and detailed. Tools to support farmers are needed.



Thank you for your attention!