A common carbon footprint approach for dairy - The IDF guide to standard lifecycle assessment methodology for the dairy sector

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IDF - A Global expertise

- IDF: A network of 1200 world dairy experts!
- A global, non-profit, science-based organization
- The most comprehensive and authoritative source of information, expertise and knowledge on dairying from farm to table
- Represented in 57 countries
- Represent +/- 86% of global milk production
IDF - A Global influence

- IDF is the centre for dairy expertise
  - developing scientific knowledge
  - exchanging information
  - creating adding value
  - addressing global issues and developments
  - facilitating networking within the sector and to the outside
IDF- Providing value to all dairy stakeholders

IDF works throughout the supply chain

- dairy farmers
- processors
- industry suppliers
- academics
- scientists
- nutritionists
Who contributes to the work of IDF?

1200 IDF experts from 59 countries

- Industry: 29%
- Academia: 33%
- Dairy Associations: 16%
- Dairy Farmers: 3%
- Governments: 10%
- Others: 9%
- Governments: 10%
- Dairy Associations: 16%
- Dairy Farmers: 3%
- Academia: 33%
- Industry: 29%
- Others: 9%
Why a common carbon footprint approach?

- Dairy sector is being challenged to quantify and reduce its carbon footprint.
- Standardised LCA methodology (ISO) and guidelines for carbon footprint (PAS 2050) exist, but they allow technical choices that can make big differences in the final results.

As a result, several C footprint have been realised:
- We obtain a wide range of results
- We can’t identify whether the difference in the result is due to a difference in the production system, or a difference in the method of calculation
A literature review

<table>
<thead>
<tr>
<th>Phase</th>
<th>Total Count</th>
<th>GHG Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy farm</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Dairy processing</td>
<td>26</td>
<td></td>
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<tr>
<td>Packaging</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Distribution</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Retailer</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Consumer</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>End-of-life</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

Distribution of GHG emissions for the dairy farm phase, in kg CO$_{2}$eq/kg milk

- Quartile 25% : 0.9
- Quartile 75% : 1.1
- Median : 0.95
- Mean: 0.99
Why a common carbon footprint approach?

- From a scientific perspective:
  - Inability to compare results
  - Inability to identify mitigation options

- From a communication perspective:
  - Confusion, contradiction, disjointed messages
An important need to evaluate the impact of Dairy on the GHG emissions

- Need to quantify the emissions
- Need to identify hot spot
- Need to understand differences
- Need to build mitigation strategies and evaluate progress

**Why a common Carbon footprint approach?**
The development process

• **IDF World Dairy Summit in Mexico (2008)**
  Decision to develop a common IDF carbon footprint for the dairy sector and allocation of work to the IDF Standing Committee on Environment

• **An action team was created (2009)**
  30 leading experts in the field of LCA and Dairy, involving both scientists and practitioners from key organisations (SAI, FAO, Consultants…).
The development process

- Organisation of the work

  - A workshop in June 2009 dedicated to Carbon Footprint methodologies.
  
  11 experts presented the state of the art on carbon footprint methodology in the Dairy Sector

  → Identified the key areas in which there was currently ambiguity or differing views on approach

  - More than a year of discussion/consultation/review
The result

- **Result in 2010**: an IDF carbon footprint methodology

A common methodology that allows calculation of the C footprint of dairy products, the same way around the world:
- Consistency
- Clear message
Existing international standardization

- ISO
  - ISO 14040, 14044 and 14067

- PAS & WBCSD/WRI
  - PAS 2050
  - GHG Protocol

- IDF
  - IDF Common Carbon Footprint methodology

Increasingly relevant and specific to the dairy sector
The methodology embraces a comprehensive range of existing international knowledge.
Key areas of the guide

- **Scope and system boundaries**

From feed production to factory gate out

- **80% to 90% of final impact**
- **10 to 20% of final impact**
Key areas of the guide

• Functional Unit :
  - Farm : FPCM - one kg of fat and protein corrected milk
  - Industry :1 kg of product packaged at dairy factory gate

• Emission factors :

Tier 2 minimum approach (IPCC 2006)
Key areas of the guide

• Allocation Milk/Meat: a physical causality approach

Based on the feed energy required for milk production/meat

\[ AF = 1 - 5.7717R \] (\( R = \text{kg meat/kg milk} \))

→ Reflects the physiological feed requirements of the cow to produce milk and meat

→ Default allocation of 14.4% for meat and 85.6% for milk
Key areas of the guide

• Allocation Process: mix

- Allocate raw milk intake + transport on the basis of the milk solids of the product

- For all other materials, energy input…:
  → if detailed process data are available: assign emissions to the specific product
  → if not: use a physico-chemical allocation matrix
# The physico-chemical allocation coefficients

<table>
<thead>
<tr>
<th></th>
<th>Raw milk</th>
<th>Raw milk transport</th>
<th>Total water use</th>
<th>Electricity</th>
<th>Fuel for thermal energy</th>
<th>Alkaline cleaners</th>
<th>Acid cleaners</th>
<th>Total wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk powder</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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</tr>
<tr>
<td>Yoghurt</td>
<td>0.16</td>
<td>0.16</td>
<td>0.28</td>
<td>0.86</td>
<td>0.11</td>
<td>0.08</td>
<td>0.01</td>
<td>0.28</td>
</tr>
<tr>
<td>Milk</td>
<td>0.14</td>
<td>0.14</td>
<td>0.15</td>
<td>0.14</td>
<td>0.03</td>
<td>0.08</td>
<td>0.01</td>
<td>0.15</td>
</tr>
<tr>
<td>Cream</td>
<td>0.47</td>
<td>0.47</td>
<td>0.15</td>
<td>0.14</td>
<td>0.03</td>
<td>0.08</td>
<td>0.01</td>
<td>0.15</td>
</tr>
<tr>
<td>Butter</td>
<td>0.88</td>
<td>0.88</td>
<td>0.40</td>
<td>0.36</td>
<td>0.17</td>
<td>0.10</td>
<td>0.50</td>
<td>0.40</td>
</tr>
<tr>
<td>AMF/Ghee</td>
<td>1.05</td>
<td>1.05</td>
<td>0.40</td>
<td>0.36</td>
<td>0.05</td>
<td>0.10</td>
<td>0.50</td>
<td>0.40</td>
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<tr>
<td>Cheese (cheddar)</td>
<td>0.64</td>
<td>0.64</td>
<td>1.40</td>
<td>0.57</td>
<td>0.1</td>
<td>0.70</td>
<td>1.00</td>
<td>1.40</td>
</tr>
<tr>
<td>Whey powder</td>
<td>1.01</td>
<td>1.01</td>
<td>1.20</td>
<td>1.50</td>
<td>1.3</td>
<td>0.90</td>
<td>2.00</td>
<td>1.20</td>
</tr>
<tr>
<td>UHT</td>
<td>0.14</td>
<td>0.14</td>
<td>0.15</td>
<td>0.29</td>
<td>0.06</td>
<td>0.08</td>
<td>0.01</td>
<td>0.15</td>
</tr>
<tr>
<td>Ice Cream</td>
<td>0.23</td>
<td>0.23</td>
<td>0.68</td>
<td>1.92</td>
<td>0.004</td>
<td>0.90</td>
<td>0</td>
<td>0.68</td>
</tr>
<tr>
<td>WPC/Lactose**</td>
<td>1.00</td>
<td>1.00</td>
<td>5.82</td>
<td>4.52</td>
<td>2.75</td>
<td>6.26</td>
<td>9.97</td>
<td>5.82</td>
</tr>
</tbody>
</table>

* coefficients based on factory average resource use and wastewater emissions for different dairy products from 17 multi-product dairy manufacturing sites  
** There was insufficient information to separate energy and mass flows for whey protein concentrate (WPC) and lactose. Some plants crystallize and dry lactose whereas others treated the lactose as a waste product.
Key areas of the guide

- Land use change/carbon sequestration

  - Include all *land use changes* occurring after 1990 (PAS 2050)

  - C *sequestration*: not to include (lack of scientific data) but can be reported separately
Limitation of the guide

- Boundaries limited to factory gate out
- No proposal of a feed data base
- An evolving area: future review to ensure we remain at the cutting edge of methodological development
- A guide limited to one impact: we need to follow a multicriteria approach,
  - to avoid shift of pollution
  - to look for global efficiency (impacts are linked together)
  - to look at new issues (ecosystem services).
Thank you