Mapping the carbon footprint of milk for dairy cows



Andre Mazzetto, Shelley Falconer, Stewart Ledgard





Life Cycle Assessment

"A technique for assessing the environmental aspects and potential impacts associated with a product, system or service"

ISO 14040 – International Standard Organisation







Cradle to grave





Mapping the carbon footprint of milk for dairy cows

Structured review of the literature

Andre Mazzetto, Shelley Falconer and Stewart Ledgard February 2021



Report for DairyNZ RE450/2020/081





Structured review of the literature

 Goal: have a robust comparison of the carbon footprint of milk production between different countries



Structured review of the literature

- Goal: have a robust comparison of the carbon footprint of milk production
 between different countries
- How it was done:
 - Cradle-to-farm-gate LCA study
 - Representative number of farms analysed
 - Standard factors calculated in a systematic way



Study claims that sample is representative or region analysed produces more than 50% of country milk production?





Study used GWP100 (IPCC, 2007)



Global Warming Potential

GWP selection

Study used GWP100 (IPCC, 2007)

No Yes

Study presents data allowing recalculation of CF using GWP100 (IPCC, 2007)



GHG	AR1 (1990)	AR2 (1995)	AR3 (2001)	AR4 (2007)	AR5 (2013)
Carbon Dioxide (CO ₂)	1	1	1	1	1
Methane (CH ₄)	21	21	23	25	28
Nitrous Oxide (N ₂ O)	290	310	296	298	265

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Functional Units

- L of milk
- kg of milk
- kg of fat-and-protein corrected milk (FPCM)
- kg of energy-corrected milk (ECM)





Contact authors for supplementary data

Did authors provide the data for re-calculation?

No

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Allocation

Study used Biological allocation (IDF)



Study presents data allowing the re-calculation of CF using "no allocation" and applying the default 85% allocation to milk (IDF)



Practices for allocation between milk and beef

- Energy
- Economic
- **Biophysical (IDF)**
- Others

Allocation





Study presents data allowing the re-calculation of CF using "no allocation" and applying the default 85% allocation to milk (IDF)



- Energy
- Economic
- Biophysical (IDF)
- Others







86 papers → 24 papers





















CATTLE CARBON CYCLING VS. FOSSIL FUELS

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Milk yield (kg FPCM cow⁻¹)













Milk yield (kg FPCM cow⁻¹)

GHG

10000

 CH_4

 CO_2 N_2O







Conclusions

• NZ showed the lowest carbon footprint (0.77 kg CO₂e / kg FPCM)



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- Allocation method is a key-factor in the footprint calculation



Conclusions

- NZ showed the lowest carbon footprint (0.77 kg CO₂e / kg FPCM)
- Allocation method is a key-factor in the footprint calculation
- Countries showed different GHG profiles, that are relevant when considering new metrics



Next steps

- Calculation of the cradle to grave footprint for NZ:
 - UHT milk exported to China
 - Whole milk powder exported to China
- Simply Milk
- Silver Fern Farms Angus net Zero
- Beef+LambNZ cradle to grave carbon footprint



Thank you

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