



## Greenhouse gas emissions related to dairy production and feeding

XXV FEFAC Congress, Hamburg (Germany), 10 June 2010

Anna Flysjö, PhD student at Arla Foods & Aarhus University  
Member of the IDF Expert Group on LCA in the Dairy Chain

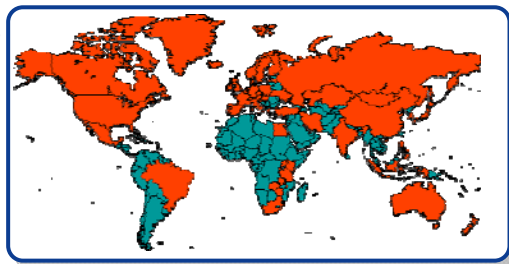


### IDF Facts & Figures

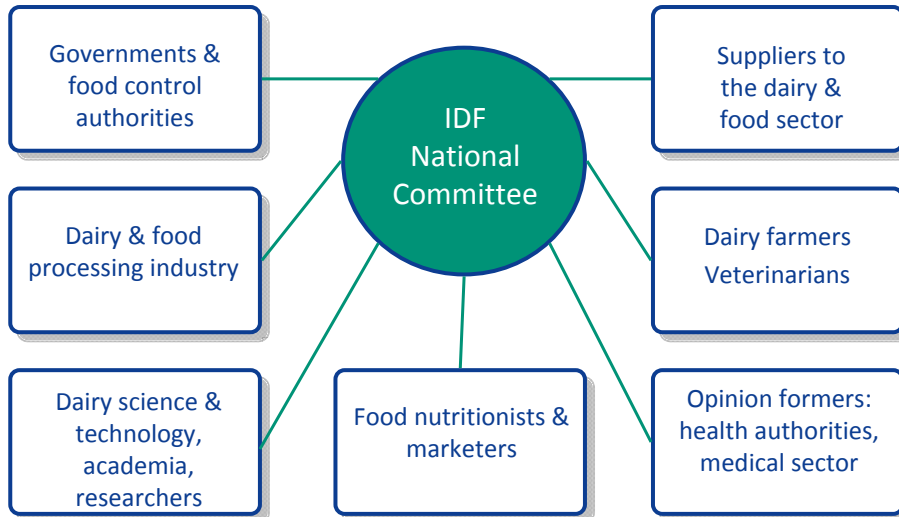
What is IDF?



- IDF: The worlds dairy experts since 1903 !
- A global non-profit and science-based organization, most comprehensive and authoritative source of information, expertise on milk and dairy products world-wide.
- 56 countries involved, representing more than 86% of world milk production.
- Growing membership , part. in develop. countries.
- Formal working relationship with FAO, OIE, ISO, Codex etc.



## The unique strength of IDF – involvement of all stakeholders in the dairy chain



## Signing of the 'Global Dairy Agenda for Action – Climate change' IDF World Dairy Summit, Berlin, Germany 24 September 2009



Green Paper was launched with some 260 sustainability activities from 40 countries.

Representing >85% of the dairy production globally.

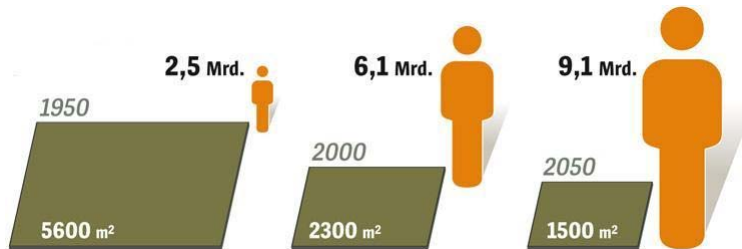


### 6 key areas

- Emission reductions
- Energy efficiency
- Transport efficiency
- Reduction in loss of milk
- Resource efficiency
- Life Cycle Assessment and management

[www.dairysustainabilityinitiative.org](http://www.dairysustainabilityinitiative.org)

## Evolution of growth of world population versus availability of arable land and animal protein



Availability of arable land per head of human population

According to FAO the world demand for animal protein will increase by about 50% by 2020 and is expected to double by 2050 !!!

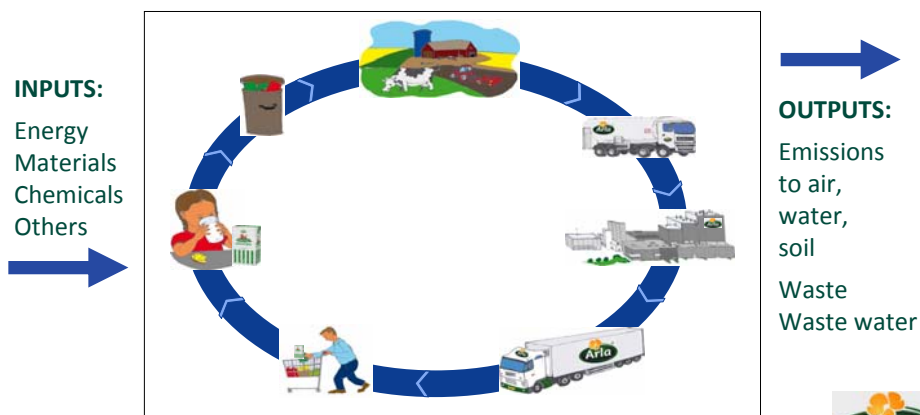
⇒ **What are the consequences for the livestock sectors?**

**Food – Feed – Fuel – Forest ??**

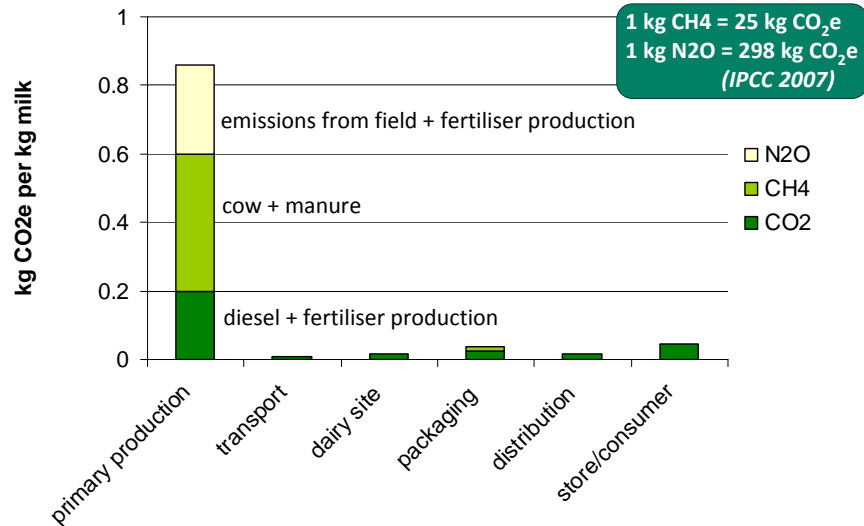
## How is the Carbon footprint for dairy products calculated?



Assess the greenhouse gas emissions for the whole lifecycle of a product, “from cradle to grave”.



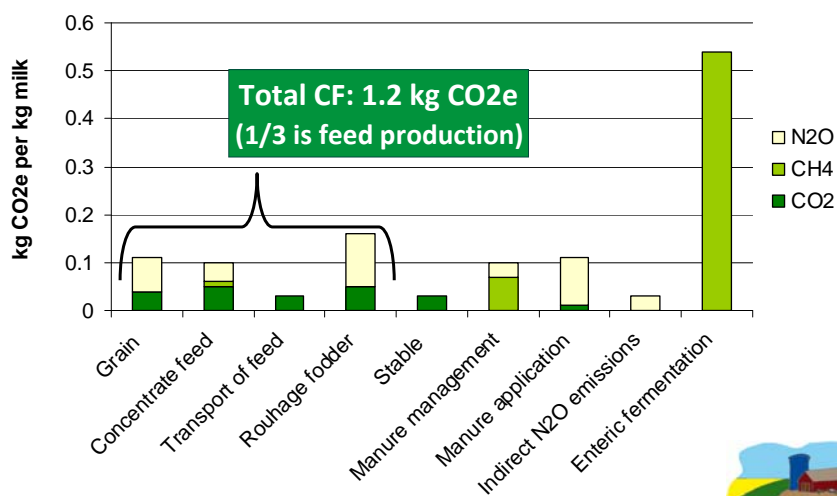
## The CF for one kg of milk in Sweden – ‘from cradle to grave’



Source: *Maten och Miljön, LCA av sju livsmedel (Food and Environment, LCA of seven foods), LRF 2002*

## Example

The Carbon Footprint of milk (incl. meat) ex farm in Sweden



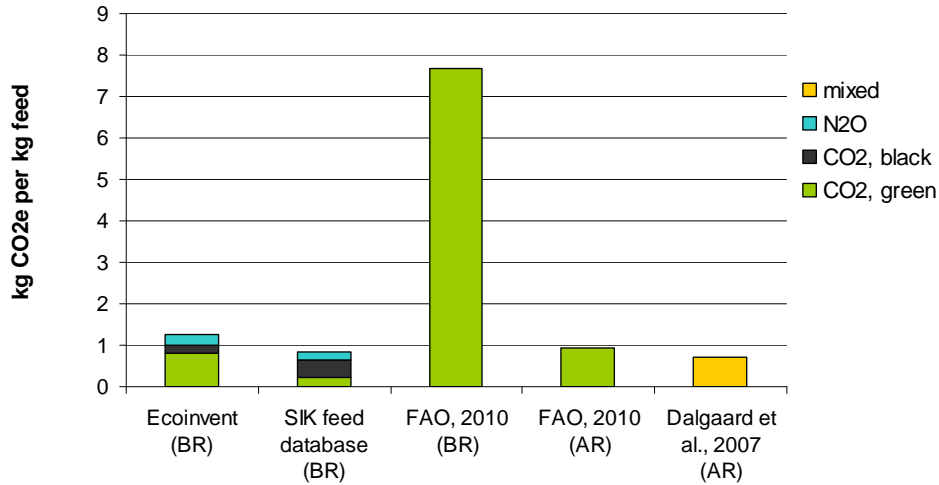
(source: Cederberg et al., 2009, SIK – the Swedish Institute for Food and Biotechnology)



# The Carbon Footprint on Soy Meal in South America

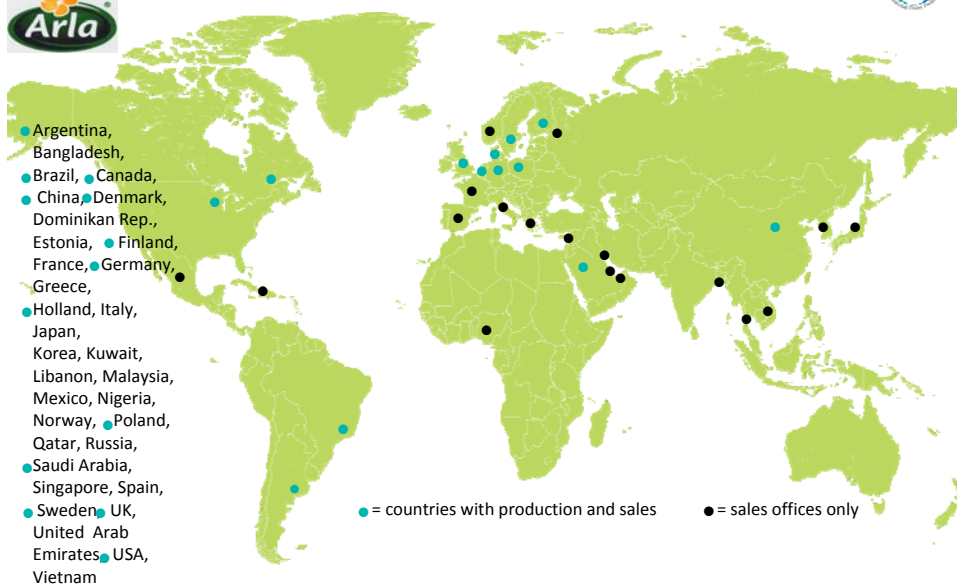


(n.b. different system boundaries!!)



## Arla Foods - across the world

- the eight largest dairy company in the world
- the world's largest producer of organic dairy products
- located in 37 countries (production or sale)



- Argentina,
- Bangladesh,
- Brazil,
- Canada,
- China,
- Denmark,
- Dominican Rep.,
- Estonia,
- Finland,
- France,
- Germany,
- Greece,
- Holland, Italy,
- Japan,
- Korea, Kuwait,
- Libanon, Malaysia,
- Mexico, Nigeria,
- Norway,
- Poland,
- Qatar, Russia,
- Saudi Arabia,
- Singapore, Spain,
- Sweden,
- UK,
- United Arab Emirates,
- USA,
- Vietnam

## Arla Foods climate target:



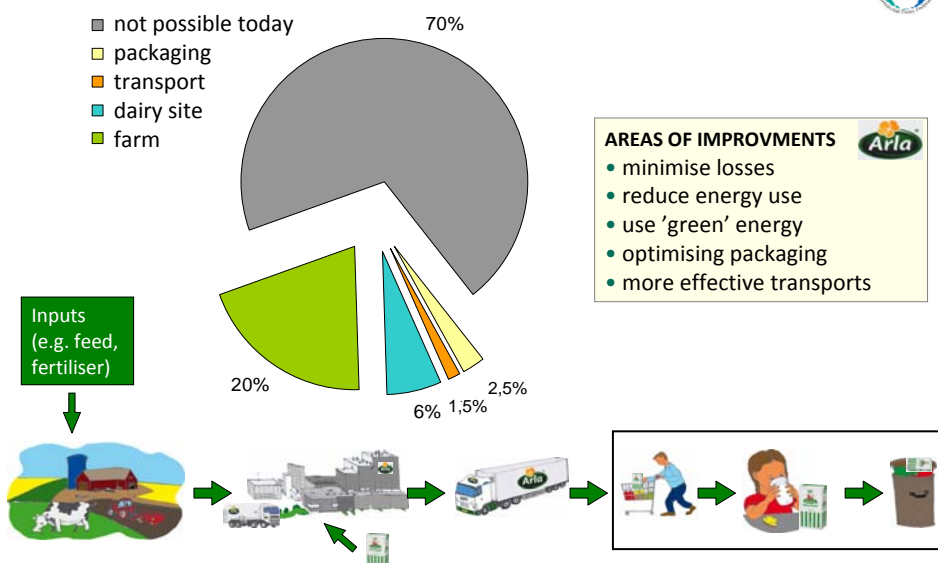
We want to reduce our CO<sub>2</sub> emissions by 25% before 2020



...and also reduce GHG emissions at agriculture, but do not know with how much yet...



## How can we improve our milk production at Arla Foods?



## IDF-FAO collaboration to improve the position of the dairy sector



- November 2008 : IDF and FAO initiates a project to disaggregate the '18% figure' and also to provide a **reference figure for GHG emissions for global milk production**, the project is also aiming at **review and revision of the methodology** used earlier.

- February 2009: FAO starts the project  
“**Greenhouse Gas Emissions from the Dairy Sector**“

⇒ April 2010 : Final FAO report published

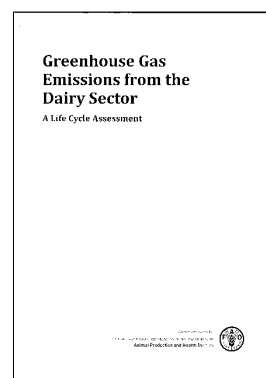
## IDF-FAO collaboration

### What are the GHG emissions from the dairy sector?



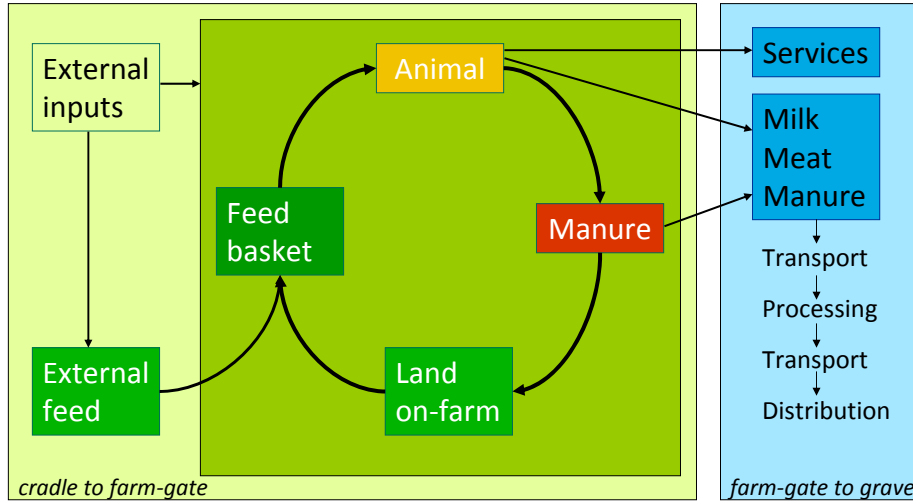
#### Main findings

- Global dairy sector contributes 4.0% (3.0-5.1) to global anthropogenic GHG emissions.
- Milk and dairy products is estimated to 2.7% (2.0-3.5) of anthropogenic GHG emissions.
- Average CF for one kg milk at farm-gate is estimated at 2.4 (1.8-3.0) kg CO<sub>2</sub>e.
- The regional variations range from 1.3 to 7.5 kg CO<sub>2</sub>e per kg milk.
- ‘Cradle to farm-gate’ emissions stand on average for 93% of total CF.

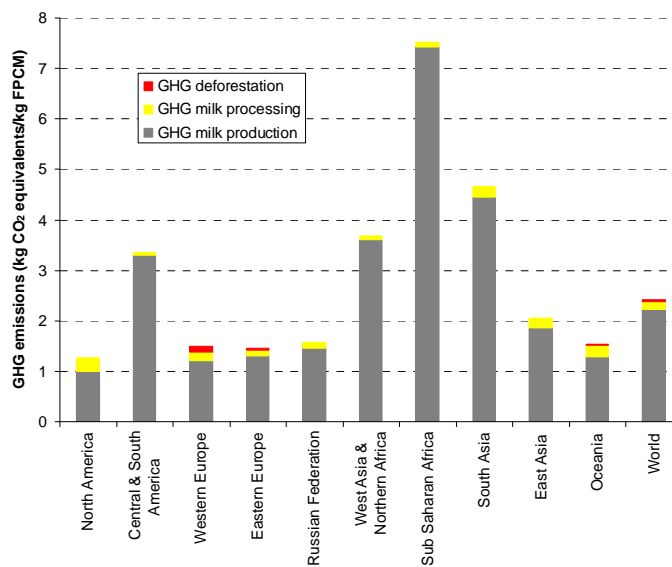


(FAO: Gerber et al., 2010)

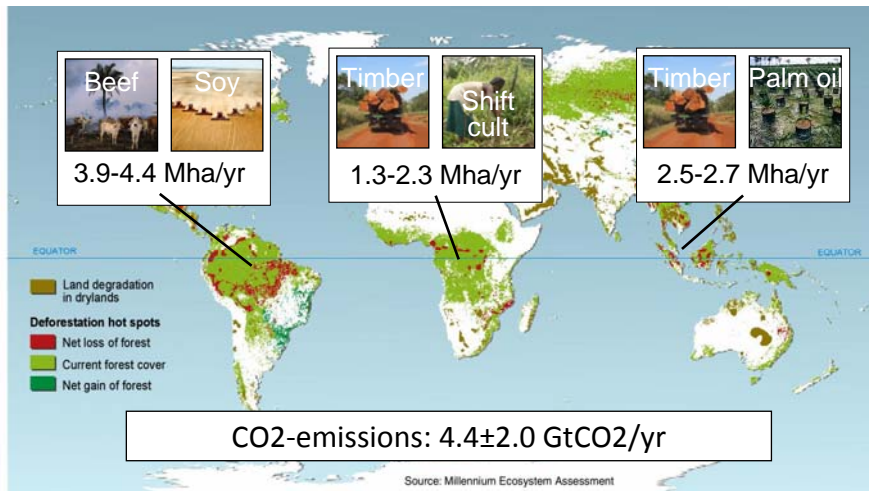
## FAO Life cycle analysis – system boundaries



## FAO report: GHG emissions per kg of FPCM averaged by main regions and for the world

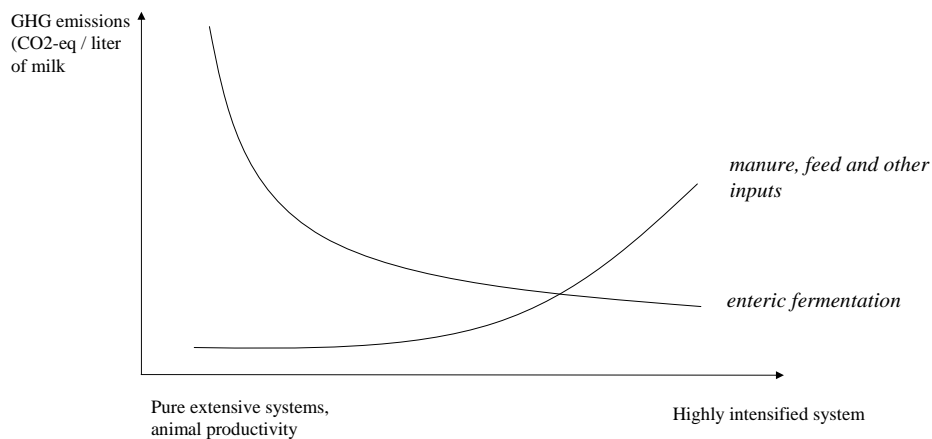


## Tropical deforestation – rates and drivers



Source: Martin Persson, Environmental Economics Unit, Department of Economics, Gothenburg University

## FAO Working hypothesis – milk production



## FAO conclusions



- Large variation in GHG emissions per kg milk between different world regions.
- Emissions from milk and beef production need to be addressed in an integrated approach.
- Animal protein (milk+meat) from dairy systems have substantially lower CF than meat from beef system (46 kg CO<sub>2</sub>e compared to 176 kg CO<sub>2</sub>e per kg animal protein in the Netherlands).
- Feed digestibility, milk yield and manure management are key factors influencing emission level.

## IDF Guide to Life Cycle Assessment and Life Cycle Management - A Common Carbon Footprint Methodology for the Dairy Sector



- **To define and agree on a common methodology**, based on Life Cycle Assessment, amongst the sector and academics, to calculate :
  - the carbon footprint
  - the water footprint
  - the biodiversity footprint of dairy products
- **To publish an IDF guideline** for calculating the CF for dairy products
- **Ultimately** to help identifying the best options to reduce the environmental impact of dairy production and to be able to measure the improvement...consistently!
- The on-going IDF LCA work involves experts from the **SAI Platform Dairy Group** and from **FAO**



**Areas included in the guidelines**

- Functional Unit
- System Boundaries
- Co-product handling/allocation
- LULUC (deforestation and carbon sequestration)
- Data collection
- Emission factors

**Conclusions**

- How can we improve CF calculations/comparisons?



- Getting industry, scientists etc together
- Identify areas where it is profitable to work together
- Follow what happens internationally in standard development
- Common methodology and specification for product groups!
- Use same database (e.g. a common feed database!!??)

➔ **Then it is of course about much more than just CF...  
(...water, biodiversity, social aspects etc.)**

## Conclusions

- Land Use and Land Use Change



- Estimating GHGs from deforestation - high uncertainties (areas, carbon stock most important)
- Land use after deforestation?
- Environmental standards for sustainable food (and bioenergy) including only direct LU effects will misinform consumers!



Join IDF at the conference on Animal Feeding, Animal Health and Welfare, Food Safety etc.  
IDF 2011 WORLD DAIRY SUMMIT, Parma, Italy, 15-19 October 2011 ([www.fil-idf.org](http://www.fil-idf.org))



**Thank you for your attention!**

**Questions?**



[anna.flysjo@arlafoods.com](mailto:anna.flysjo@arlafoods.com)