Sustainability assessment of the food chain – EFFoST Seminar series 22nd of October 2021

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# Challenges and recent solutions in executing food related LCA

PRé

# About PRé Sustainability

PRé helps companies **turn sustainability strategy into action**, through fact-based consulting services, training and software solutions based on life cycle thinking.

# About PRé: a leading voice in life cycle thinking

Active role in many global sustainability initiatives:

- UN Life Cycle Initiative
- European Commission's Environmental Footprinting (EF) initiative
- Community-Driven Life Cycle Information
- InData
- European Committee for Standardization (CEN)

Developed the world's most widely used LCA software: SimaPro

Developed widely recognized and applied environmental assessment methods: ReCiPe, Eco-Indicator 99

# Life cycle assessment (LCA): what is it?

- Science-based methodology
- Evaluates environmental and social impacts associated with a product or service
- Standardized methodology ensures reliability and transparency
- Shows impact per life cycle stage

# Why use LCA?

- Report the environmental impact of the product
- Determine hotspots (improvement opportunities)
- Benchmarking and performance
- Product development
- Personal, functional & organizational targets

# Challenges in executing a food LCA

Primary data / data collection

Food loss data

Pesticide emissions

Water use

Nitrogen and phosphorus emissions

Biodiversity

Standardized approach for all situations

# Challenge: primary data / data collection

- Modeling food products requires a lot of data input from every step of the supply chain:
  - Material use
  - Energy use
  - Water use
  - Soil characteristics
  - Emissions
  - Waste
  - Crop rotation
- Wide range in the extent of data collection (systems) at different suppliers
- Seasonality can influence the data

# Solutions: primary data / data collection

- Databases with background data can be used as proxy
- Default data from standards, e.g. PEFCR
- Assumptions
- Three-yearly average
- Collaborate with suppliers
- Agricultural working group EC

# Challenge: food loss data

- Food loss has different definitions
- In our LCA studies food loss has a big impact on the environmental impact
- Food loss depends on the product
- Often food loss data is given in total amounts per country
- Need product-specific food loss data in percentage for every part of the supply chain, i.e. % of bought/sold food that is wasted

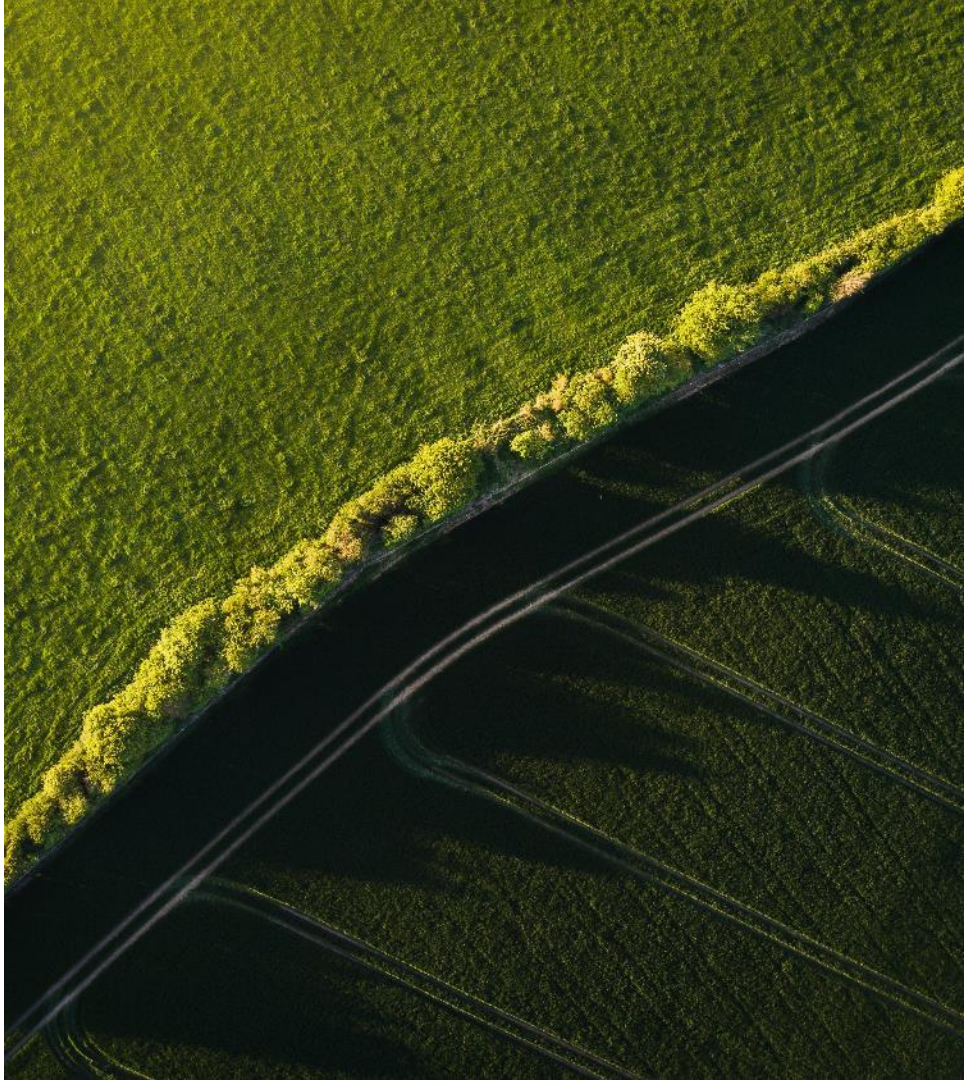
# Solutions: food loss data

- We define food loss as food that does not go to human consumption
- In our LCA's, food production needed to compensate for losses are attributed to the life cycle stage where the losses occur

  e.g. 0.5 kg food loss in distribution requires 0.5 kg more food production of which the impact is than attributed to distribution
- Default data from standards is often higher than what actors provide themselves
- Incentive to provide primary data

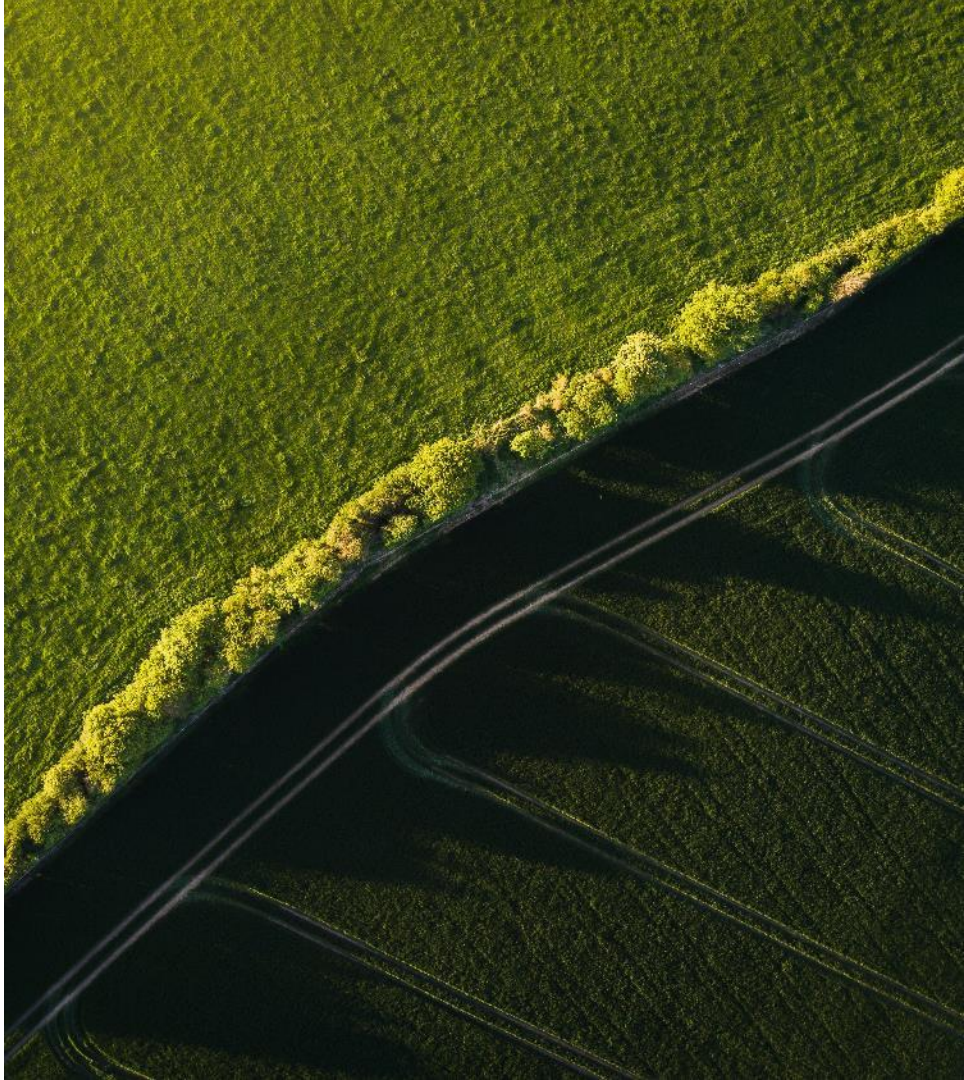
# Challenge: Pesticide emissions

- Pesticide emissions can have a high impact on toxicity
- Depends on type of pesticide and the fate of that pesticide
- Currently modelling with fixed percentage (PEF)
  - 90% to soil
  - 9% to air
  - 1% to water
- Ingestion of pesticides with food are not accounted for



# Solutions: pesticide emissions

- Agricultural working group EC
- PEST-LCI: open field only
  - DynamiCrop (human ingestion)
- Milieu-indicator Gewasbescherming (Environmental indicator plant protection): only for greenhouses
- Are the methods comparable?



# Challenge: water use

- Depending on the location, water use can have a very big impact
- Two types of water use:
  - Irrigation
  - Rainwater
- In the current method, using rainwater does not have an environmental impact
- However, it does prevent the rainwater from entering natural systems

# Solutions: water use

- Water scarcity method looks at location of water use
- We would argue to treat rainwater like other water sources
  - Removes water from water cycle
  - Prevents water from entering a lake or river, and taking water from there does have an environmental impact
- Agricultural working group EC

# Challenge: nitrogen and phosphorus emissions

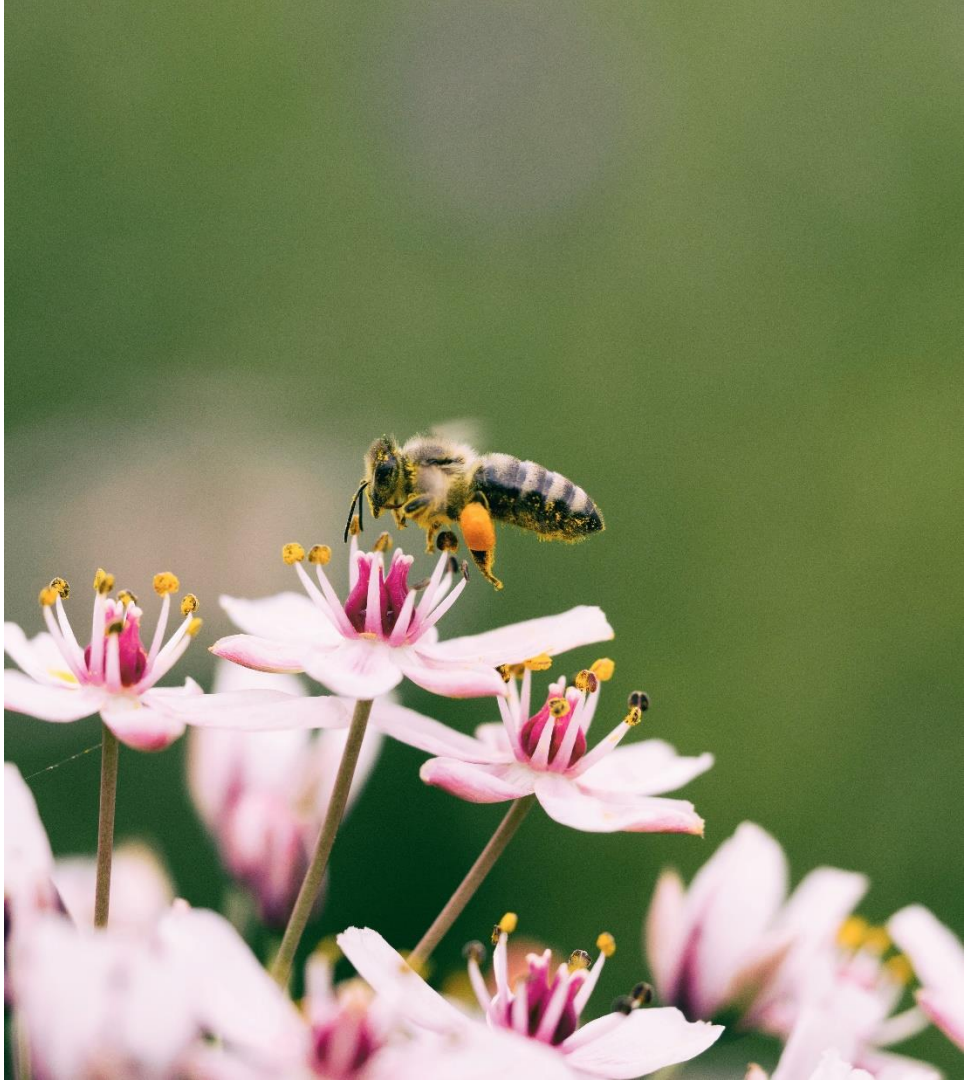
- Nitrogen and phosphorus emissions can impact climate change and eutrophication
  - $NH_3$
  - $N_2O$
  - $NO_3^-$
  - $PO_4^{3-}$
- From fertilizer application and animal excretions
- Depends on soil characteristics
- Nitrogen balance
- Not for every fertilizing system

# Solutions: nitrogen and phosphorus emissions

- Agricultural working group EC
- IPCC 2016
- HortiFootprint Category Rules (HFCR) N & P modelling approach
  - Preferred modelling based on soil characteristics
  - Default based on IPCC factors

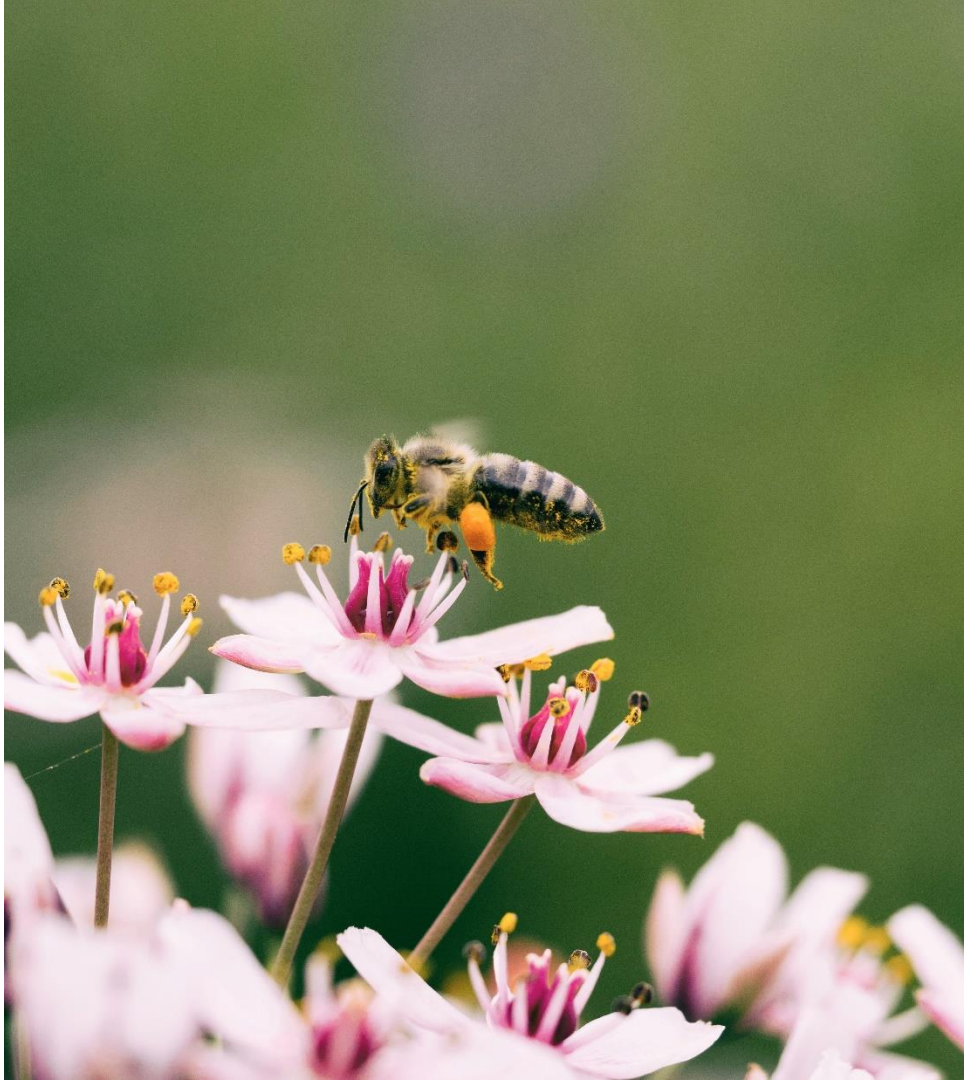
# Challenge: biodiversity

- Agriculture can have an impact on biodiversity
- Hard to measure
- No standardized method yet
- Different ways of expressing biodiversity
  - Number of species
  - Key species
  - Ecosystem functions
  - Percentage of lost species



# Solutions: biodiversity

- Agricultural working group EC
- Different models available
  - ReCiPe
  - LC Impact
  - Impact World +
  - Stepwise
  - Ecoscarcity
  - GLOBIO
  - Land use intensity characterization factors



# Challenge: standardized approach

- For comparison of products, a standardized approach is key
- Methodological choices can highly influence the results of an LCA
- Lots of different food products

# Solutions: standardized approach

- PEF & PEFCR
  - Beer
  - Dairy
  - Feed for food producing animals
  - Olive oil
  - Packed water
  - Pasta
  - Marine fish
  - (Cut flowers and potted plants)
- HFCR
- Continuing development

# Take home messages

**Environmental footprint**
LCA can be used to quantify the environmental impact of food products per life cycle stage.

**Focus where it matters**
By knowing where in the supply chain, the biggest impact is, efforts to reduce the impact can be targeted towards where it matters most.

**Challenges**
The food system is complex, leading to challenges in executing food LCA's.

**Solutions**
Working groups of the EC are working on these challenges and new methods arise.

**Collaboration is key**
Collaboration with other partners in the supply chain will help overcome these challenges.

# Thank you

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