SEVENTH FRAMEWORK PROGRAMME

SENSE

Harmonised Environmental Sustainability in the European food & drink chain

KEY ENVIRONMENTAL PERFORMANCE INDICATORS (KEPI'S) FOR SIMPLIFIED LCA'S IN FOOD SUPPLY CHAINS

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About SENSE

- Funded by EU - 23 partners from 13 European countries
- February 2012 –January 2015
- SENSE will deliver a harmonized system and a tool for environmental and social impact assessment of food and drink products – the SENSE tool

- Focus on small and medium sized companies (SME) in the food and drink sector
- Enhance environmental awareness in SMEs by offering a harmonized data collection system and simplified assessment of environmental impacts
  - Communication / marketing
  - Improvements based on facts

Curious? Look here: http://vimeo.com/51922000

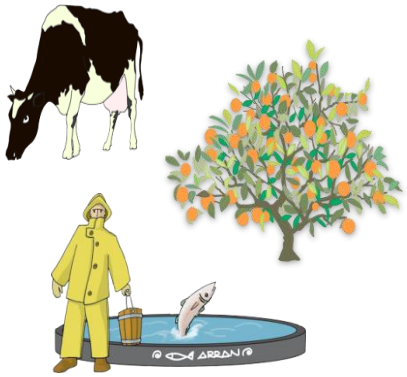
Why KEPIs?

- To simplify data collection in SME's while maintaining LCA quality
- Simple to measure indicators – easy to understand
- Linked to key environmental challenges – can be linked to more than one challenge
- Indicator for each production step – e. g. crop production or food processing
- Builds on accessible yearly production data

- A KEPI can be:
  - Common performance indicators – e.g. electricity consumption
  - Other key parameters – e.g. composition of feed to animals

Three food chains has been studied

- Milk and meat
- Orange juice
- Aquaculture



KEPIs has been defined from:

1. Literature review to define main environmental impacts and challenges
2. LCA of participating SME's products

Key environmental challenges from literature review

Challenges	Production step
Use of fossil fuels	All production steps in the supply chain
Nitrogen fertiliser production Use of N and P fertiliser and manure Heavy metals from fertiliser and manure Use of pesticides Irrigation	Cultivation of biomass for food and feed
Land use	Cultivation of biomass for food and feed Animal rearing
Manure handling Enteric fermentation Use of medicines Nutrient release from aquaculture Escapes, diseases etc. in aquaculture	Animal rearing
Use of water Waste water	Feed and food industry

Environmental impact categories from challenges

Challenges	Environmental impact category
Nitrogen fertiliser production, Use of N fertiliser and manure, Enteric fermentation, Manure handling, Use of fossil fuel, Refrigerant leakage	Climate change
Use of N and P fertiliser and manure, Manure handling, Nutrient release from aquaculture, Waste water	Eutrophication
Use of N fertiliser and manure, Use of fossil fuels	Acidification
Use of pesticides	Human toxicity
Heavy metals from fertiliser, Use of pesticides, Use of medicines	Ecotoxicity
Land use efficiency	Land use
Use of fossil fuels, Use of P fertiliser	Abiotic resource depletion
Irrigation, Water use	Water depletion
Land use, Use of pesticides, Escapes & diseases etc. in aquaculture	Biodiversity

LCA in SME's – pilot tests

- What is the aim of these LCA?

  Identify essential input data

  Test our approach

- Similarities between pilot tests:
  - Impacts of feed production: pesticides, fertilisers, land use, energy use
  - Impacts of animal husbandry: emissions
  - Processing into food for human consumption: energy and water use, packaging

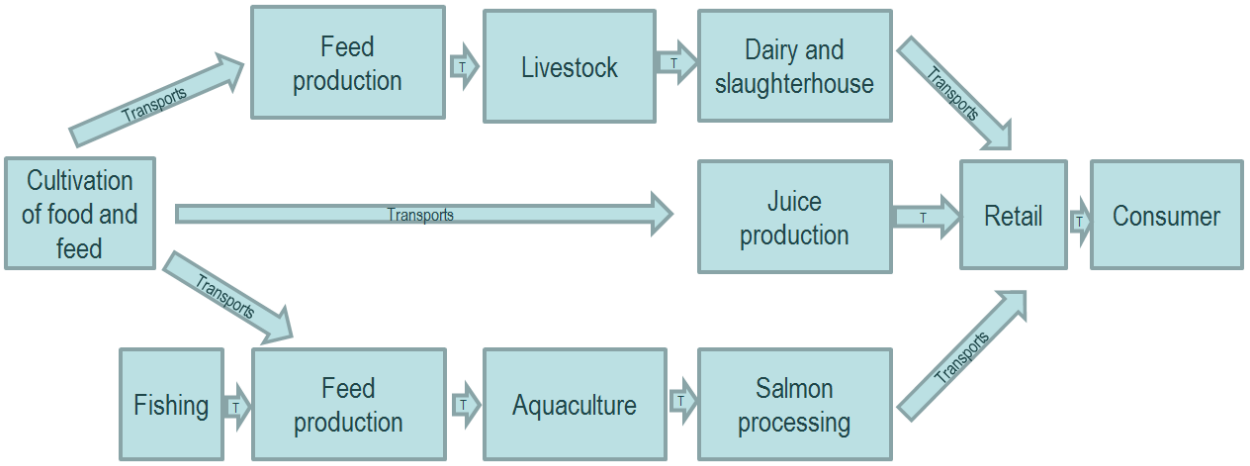
  - **Propose key environmental performance indicators (KEPIs)**

Identified Key Performance Indicators

Impact category	Plant production								Fishe-ries	Aquaculture						Livestock - ruminants					Food and feed processing					Special			Main pollutants
																										Dairy	Slaughte-ring	Juice processing	
Unit	kg N/hectare kg N/kg crop	kg-P2O5/hectare kg-P2O5/kg crop	kg N/hectare kg N/kg crop	kg/hectare kg/kg crop	l/hectare l/kg crop	ha/kg crop	ha/kg crop	m3/hectare m3/kg crop	MJ/kg product	kg/kg	MJ/kg product	kWh/l product	kg waste/kg product	m3/kg product	kg/kg product	kg raw milk/dairy cow	kg feed/kg live weight	m2/kg product	kWh/kg raw milk	m3/ kg raw milk	MJ/kg product	kWh/l product	m3/ kg product	type/kg product	kg waste/kg product	kg raw milk/kg product	kg live weight/kg meat	kg orange/l orange juice	
Key Environmental Performance Indicator (KEPI)	N-fertiliser use	P2O5-fertiliser use	Manure and slurry application	Pesticide and active substance content	Diesel use incl. machineries	Arable land use	Grazing land use	Water use	Energy use	Feed Efficiency (FCR [1]: Feed used/Fish produced)	Energy use	Electricity use	Organic waste to sea	Water use	Packaging material	Raw milk production	Feed efficiency	Buildings	Electricity use milking	Water use milking	Energy use	Electricity use	Water use	Packaging material	Waste	Raw milk input	Meat production	Yield	
All impact categories										x						x	x								x	x	x	x	
Climate change	N2O		N2O		CO2				CO2		CO2	CO2			CO2	CH4			CO2		CO2	CO2		CO2					CO2, CH4, N2O
Human toxicity		HM			HM													HM											Heavy metals (HM)
Acidification	NH3		NH3		NOx											NH3													NOx, NH3
Eutrophication, terrestrial	NOx		NH3		NOx																								NO3, NH3
Eutrophication, freshwater		PO4		PPP	PO4	PO4	PO4																						PO4
Eutrophication, marine	NO3		NO3		NOx								x																NO3 (Nitrate), NOx
Ecotoxicity, freshwater		HM		PPP	HM																								Heavy metals (HM) Plant Protection Products
Land use						x	x																						Land use (m2a and type)
Abiotic resource depletion	x	x		x	x				x		x	x			x			x	x		x	x		x					Fossil resources
Water depletion					x			x						x						x			x						Water use

KEPIs identified for production steps – "cradle to retail intake"

- Biomass production (food and feed)
- Fisheries
- Aquaculture
- Livestock
- Food and feed processing
- Transports



KEPI Plant production

KEPI	Unit
Nitrogen fertiliser use	kg N/hectare, kg N/kg crop
Phosphorus fertiliser use	kg-P_2O_5/hectare, kg-P_2O_5/kg crop
Manure and slurry application	kg N/hectare, kg N/kg crop
Pesticide and active substance content	kg/hectare, kg/kg crop
Diesel use incl. machineries	l/hectare, l/kg crop
Arable land use	ha/kg crop
Grazing land use	ha/kg crop
Water use	m^3/hectare, m^3/kg crop

KEPI Aquaculture

KEPI	Unit
Feed Efficiency (FCR1: Feed used/Fish produced)	kg/kg
Energy use	MJ/kg product
Electricity use	kWh/l product
Organic waste to sea	kg waste/kg product
Water use	m^3/kg product
Packaging material	kg/kg product

Fisheries

KEPI	Unit
Energy use	MJ/kg product

KEPI Livestock

KEPI	Unit
Raw milk production	kg raw milk/dairy cow
Feed efficiency	kg feed/kg live weight
Buildings	m^2/kg product
Electricity use milking	kWh/kg raw milk
Water use milking	m^3/kg raw milk

KEPI Feed and Food processing

KEPI	Unit
Energy use	MJ/kg product
Electricity use	kWh/kg product
Water use	m^3/kg product
Packaging material	type/kg product
Waste	kg waste/kg product

	KEPI	Unit
Dairy	Raw milk input	kg raw milk/kg product
Slaughterhouse	Meat production	kg live weight/kg meat
Juice processing	Yield	kg orange/l orange juice

Conclusions

- Identified KEPIs are relevant for many more food products although some are specific for a food chain
- The selected KEPIs contribute on average to 90-95 % of the environmental impacts of the food supply chains studied
- Validation based on the selected KEPIs has showed that the SENSE tool can be used for a simplified assessment of the selected impact categories
- The SENSE tool is currently tested by SMEs
- The SENSE tool gives opportunities to benchmark products environmental and social performance with products from other companies
- In addition to assessing environmental impact with LCIA methodology in the SENSE tool a further improvement would be to include an option to calculate other relevant indicators from the input data, e.g. kg N/kg product or Feed conversion rate in aquaculture

Thank You for Your attention