

FeedPrint

Carbon Footprint Animal Nutrition

A database and calculation tool of the feed production chain
to calculate GHG emissions by using LCA

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Scope of the CFPAN project

Strategic goals:

- awareness of and insight in GHG emissions
 - production chain of animal feed and from feed utilization;
- identify potential mitigation options
- *not meant for use in carbon labelling !!*

Operational goals:

- Elaborate methodology: scientific sound, international alignment
- Develop robust database
- Develop calculation tool including animal nutrition
 - *Methodology, database and tool are public available*

Use of the CFP calculation tool “Feedprint”

- Main users:
 - Compound feed industry and their suppliers
 - Coupling with feed optimization programs
- Main applications:
 - Strategic management
 - Sourcing feed materials
 - Change compound feed composition
 - Affect upstream production
 - Corporate Social Responsibility Reporting
- International alignment and application
 - FAO, FEFAC, IDF, JRC, SCP-RT,...

Standards in alignment of GHG calculations

- ISO 14000/14044
- PAS2050, British Standards Institute (2008 & 2011)
- IPCC Guidelines for National Inventory Reports
 - No LCA, GHG guidelines, strict sectorial approach
- IDF Guide to standard LCA, bulletin 445/2010
 - Combining LCA and GHG guidelines

- Product Environmental Footprint Guide EU (draft)?
- Food SCP Harmonised Framework?

Life Cycle Assessment in agricultural

systems and others prescribe how to define:

- System Borders
 - Functional Units
 - Allocation rules
- Agricultural systems:
- diffuse sources, biological processes
 - simulation models and calculation rules required
- Data requirement and collection issues:
- Process data, not (only) outputs
 - Many relatively small holdings, diffuse source
 - Variation between farmers, locations and time

Allocation in processing and livestock production

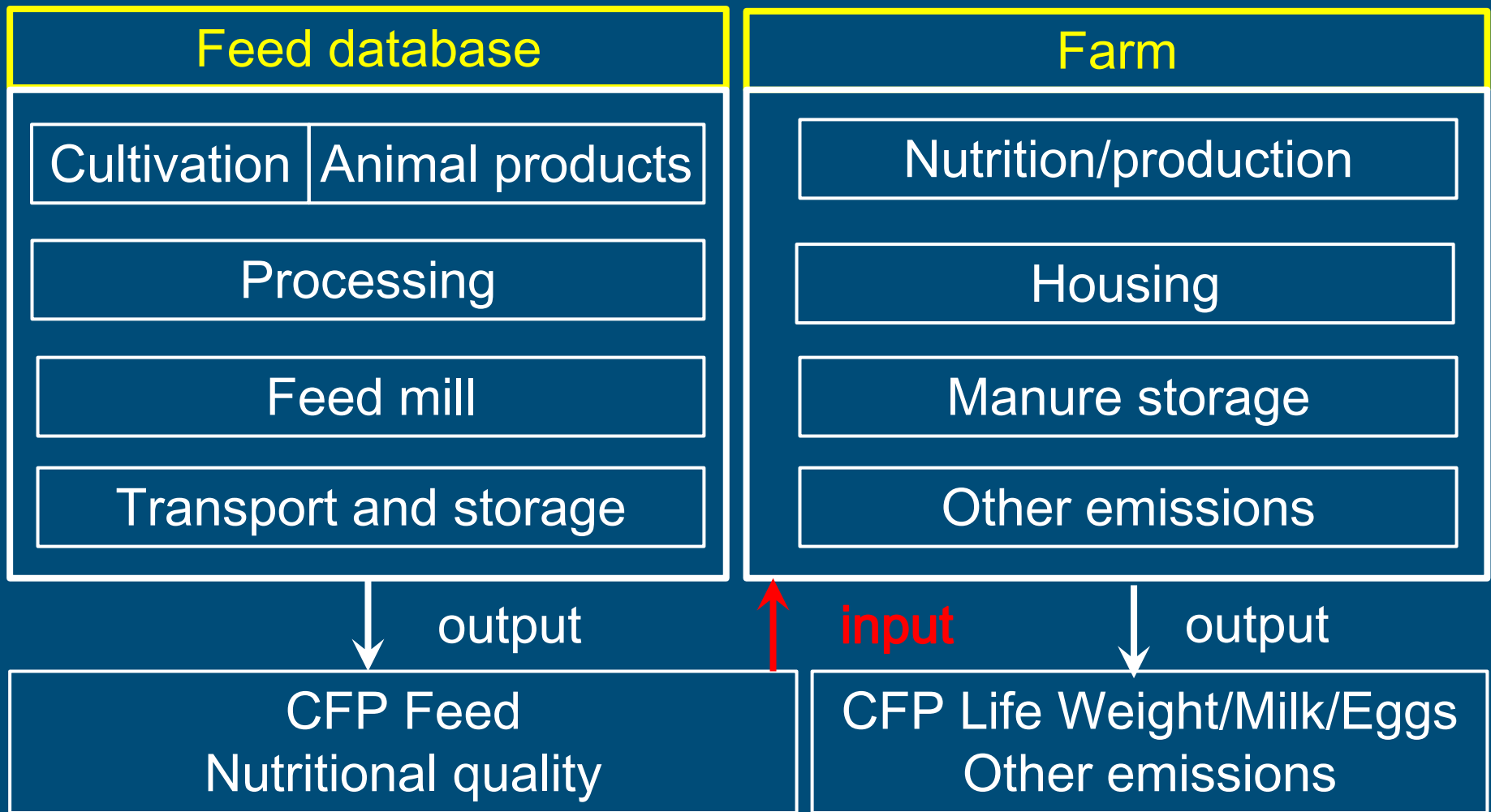
- Preferred approach in feed: economic allocation
- Other options available: mass, gross energy
- Show embedded (allocated) emissions
 - What enters “your” link in the chain
 - What is the contribution of your link

Modelling biological processes

■ Emission factors: 2006 IPCC Guidelines

- Volume 4: Agriculture, Forestry and Other Land Use
 - Chapters 2-6: Carbon stock changes related to land use change i.e. grassland degradation, deforestation
 - Chapter 10: livestock and manure management
 - Chapter 11: nitrous oxide emissions from managed soils
 - Enteric fermentation cattle: based on accepted Tier 3 (NIR)
- Animal Nutrition:
 - Cattle: cow-model Wageningen Livestock Research
 - Pigs: INRA-porc combined with Dutch basic model
 - Chicken: BPHL-model (King, 2001);
 - Layers: Johnston&Gous (2007), vanKrimpen et al. (2011, 2012)
 - Veal: simplified meta model from the Dutch veal sector

The proof of the pudding is in the eating !



So far, so good...

- Methodologies of ISO, PAS, EC are relatively similar
- However,...
 - The proof of the pudding is in the eating
 - The methodology is only one part of the story
 - Data is the other (exciting) part
- Food and feed come from the same crop

Mitigation options, a protocol at sector level

- FeedPrint contains default data, which are actually secondary data
- A protocol describes when to use these data and when to collect additional primary activity data and how to account for them
- Main principle is that communication on improved performance must be based on primary activity data

Data collection

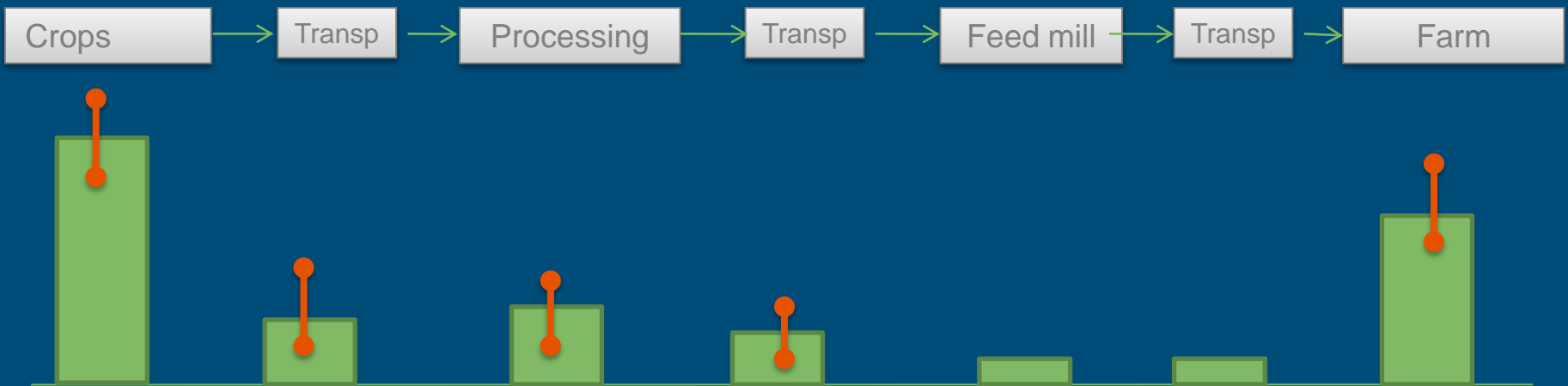
The challenge



LIVESTOCK RESEARCH
WAGENINGEN UR

BLONK | MILIEUADVIES
giving shape to sustainability

Required data



Emission	kg CO ₂ eq	Data (average and variation)
CO ₂ fossil	1	fossil MJ en kg CO ₂ e-MJ
CO ₂ biogene	0	not calculated (+1 and -1)
CH ₄	25	measured and calculated according IPCC &
NIR		
N ₂ O	298	calculated according IPCC op N fluxens
Land use change:		
m ² *year	0.1	

Available data in FeedPrint

Background processes: <ul style="list-style-type: none"> • Production of energy/ transport means/ capitalgoods/ chemicals 	Foreground processes : <ul style="list-style-type: none"> • Agriculture • Processing to raw materials • Processing to compound feed • Transport • Feed consumption
Default data at process level	Default data at process level Default data at product level <ul style="list-style-type: none"> • Set of about 340 feed materials with GHG: kg CO2e/kg feed
Not possible to change data	Possible to use own data for process parameters
	No economic parameters or other system boundaries

Data collection issues 1

- Life Cycle Assessment requires process data
 - Application of manure, fertilizer, pesticides per crop;
 - Energy and auxiliary materials per (sub) process
- Statistics collect input- and output data
 - Collected for economic purposes;
 - National or sector level;
 - Fossil fuel use, crop yields, import/export
- Process data available?
 - Agriculture: limited case studies – assumptions (gu)estimates;
 - Industry: competitive situation, no data sharing

Data collection issues 2

- Systematic approach for all feed materials:
 - Transport distances and means, calculation rules, midpoint locations and ports
 - Industrial processing: two types
 - Prices, 5 year averages, Free on Board (FOB)
- Manure application
- Land Use Change
- Data quality rules (Ecoinvent)

Data analysis and interpretation

Multiple values, expert judgement:

- Pedigree matrix is helpful in decisions on average values
- Confidentiality interval, uncertainty
 - Uniform, normal or lognormal distribution

Wide variation between companies and countries

In case of lack of data: standard procedure for defaults

e.g. MEXALCA

When to use default or primary data

- A protocol defines the rules
- Depends on the goal of the analysis
- Four goals:
 - → For organizations that formulate feed products (either in a factory or on the farm), this protocol:
 - Hot spot analysis
 - Search for feed materials with a lower GHG emission
 - Monitoring trends and progress of mitigation programs
 - → For organizations that produce feed materials, this protocol enables the calculation of GHG emissions of these materials according to the CFPAN methodology.

When to use default or primary data

Goal hot spot analysis (10.2 in protocol)

Primary activity data = specific

- Primary activity data shall be collected of the following processes and or parameters
 - specific energy use in feed formulation
 - transport distances from feed ingredient suppliers (processing industry, feed concentrate producers, or warehouses) to feed formulators
 - transport modalities used at transportation

- These data shall encompass all processes included within the system boundaries of feed production as described in section 6.1

When to use default or primary data

Goal hot spot analysis (10.2 in protocol)

To enable a proper interpretation of the GHG assessment, the following information shall be recorded and reported in documentation according to the standard format provided by the tool.

- applied primary data
- applied adaptations of default data of feed materials
- new data of feed materials
- applied estimations for filling data gaps
- remaining data gaps
- average results
- calculated variation

How to proceed with GHG calculations of feed



Future use: data and method sharing

- FAO/FEFAC: adding new defaults feed at global scale
- Methodological adjustment (consensus), might create data requirements
- Multiple calculation option: allocation, manure LULUC
- Joint database, joint model ?
 - Depends on goals, labelling requires strict organisation
- Develop maintenance infrastructure

Future use: extension of options

- Extend possibility for primary data
 - Other target groups
- Extend to other environmental impact categories
 - see e.g. Product Environmental Footprint Guide

Conclusions

- FeedPrint is based on LCA production principles
- (GHG) emissions of food and feed are closely related
- The data for LCA are the challenge, not the “rules of the game”

Future options

- Cooperation of feed and food (and fuels, fibres?) on
 - A common methodology
 - A harmonised database for default data
 - A common protocol for assessing mitigation options