DRAFT FOR PUBLIC REVIEW

Greenhouse gas emissions and fossil energy demand from poultry supply chains

Guidelines for quantification

leap

LIVESTOCK ENVIRONMENTAL ASSESSMENT AND PERFORMANCE PARTNERSHIP

Webinar: Introduction of Guidance for Poultry

4 June, 2014



Poultry Technical Advisory Group

Greg Thoma, Jamie Burr, Ayao Missohoiu,
Ilias Kyriazakis, Jason Gittins,
Md. A. Saleque, Julio Palhares,
Stephen Wiedemann, Masayuki Kanzaki


Process and Content

- Largely consensus driven
- Attempted pragmatic guidelines flexible enough to handle wide diversity of production, but as prescriptive as possible
- Based significantly on extant standards and refined based on practitioner experience
  - Review of extant studies and standards to identify commonalities and differences (in an Annex)

Guiding questions behind methodology development

- What level of complexity?
  - Streamlined versus detailed LCA
- Goal & Scope Definition
  - What the system boundary?
  - What functional unit(s)?
- What allocation method(s)?
- Limitations
  - Only GHG and fossil energy demand

Goal & Scope Definition

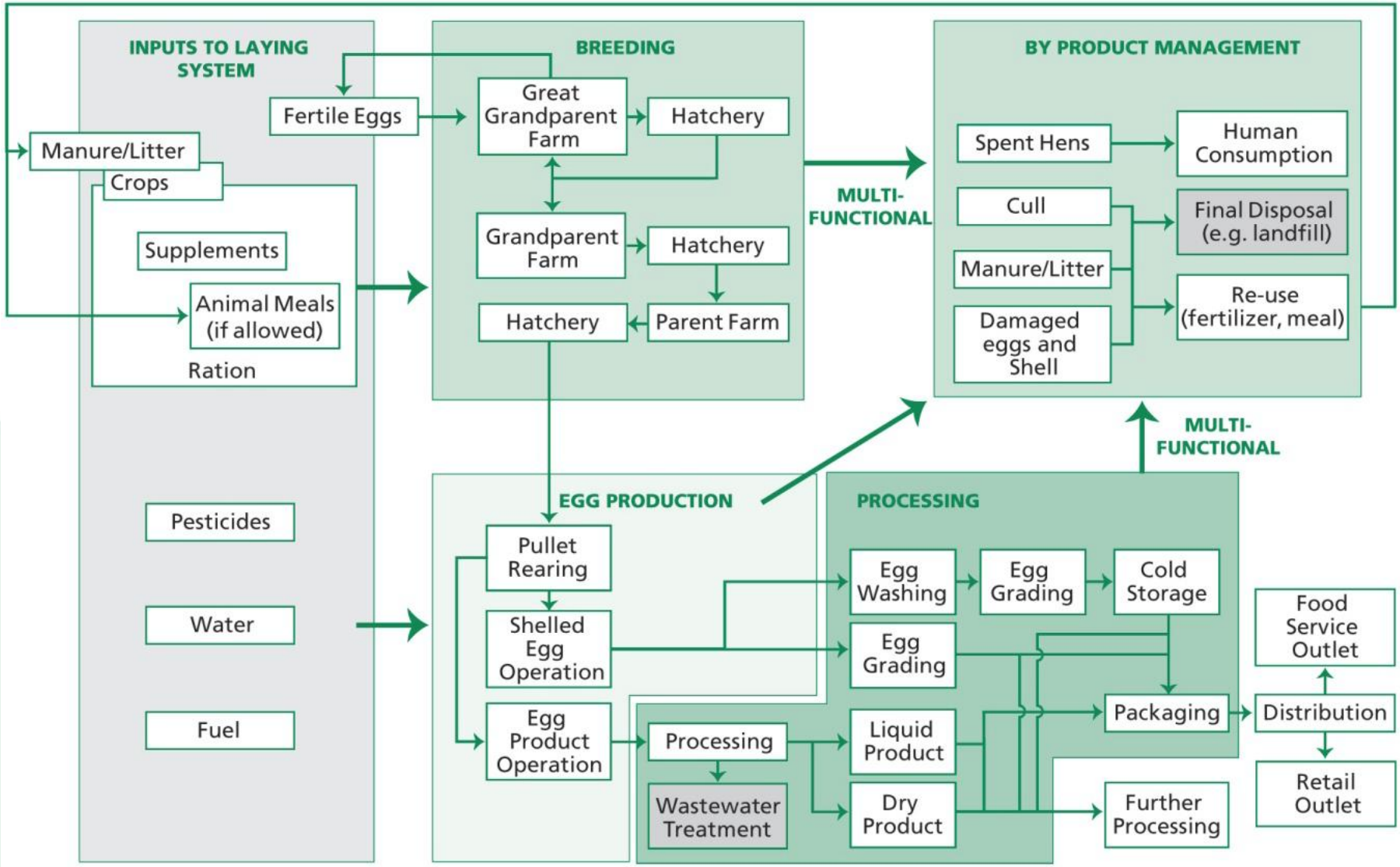
- System boundary
  - Cradle-to-farm-gate
  - Cradle-to-processing-gate
- Animal types and systems
  - Broilers, layers, breeders – chicken and turkey
  - Backyard through large-scale commercial
- Products covered
  - Meat (including edible offal) & egg products, other co-products (rendering)

What is the system boundary?

Upstream boundary = cradle (rations, fuel…) plus great grandparent breeding stock level.

Downstream boundary = manufacturer loading dock (retail, food service and final consumption are excluded). Data availability and absence of retail stakeholders led us to this boundary decision. Also products such as frozen meals are too complex.

This boundary also is a point through which virtually all production systems share – allowing a degree of comparability and consistency for different practices.



Foreground/Background systems or processes;
Primary/secondary data (proxy & model)

What functional unit(s)?

FU should be specified ***at*** the system boundary: e.g. 1000 kg edible carcass (or eggs) at the processor gate or at the retail receiving dock.

In some cultures, bones (or feet) are consumed, so FU should include these products.

FU should be well characterized: specify moisture, fat and protein content for meat, and egg's shell percent.

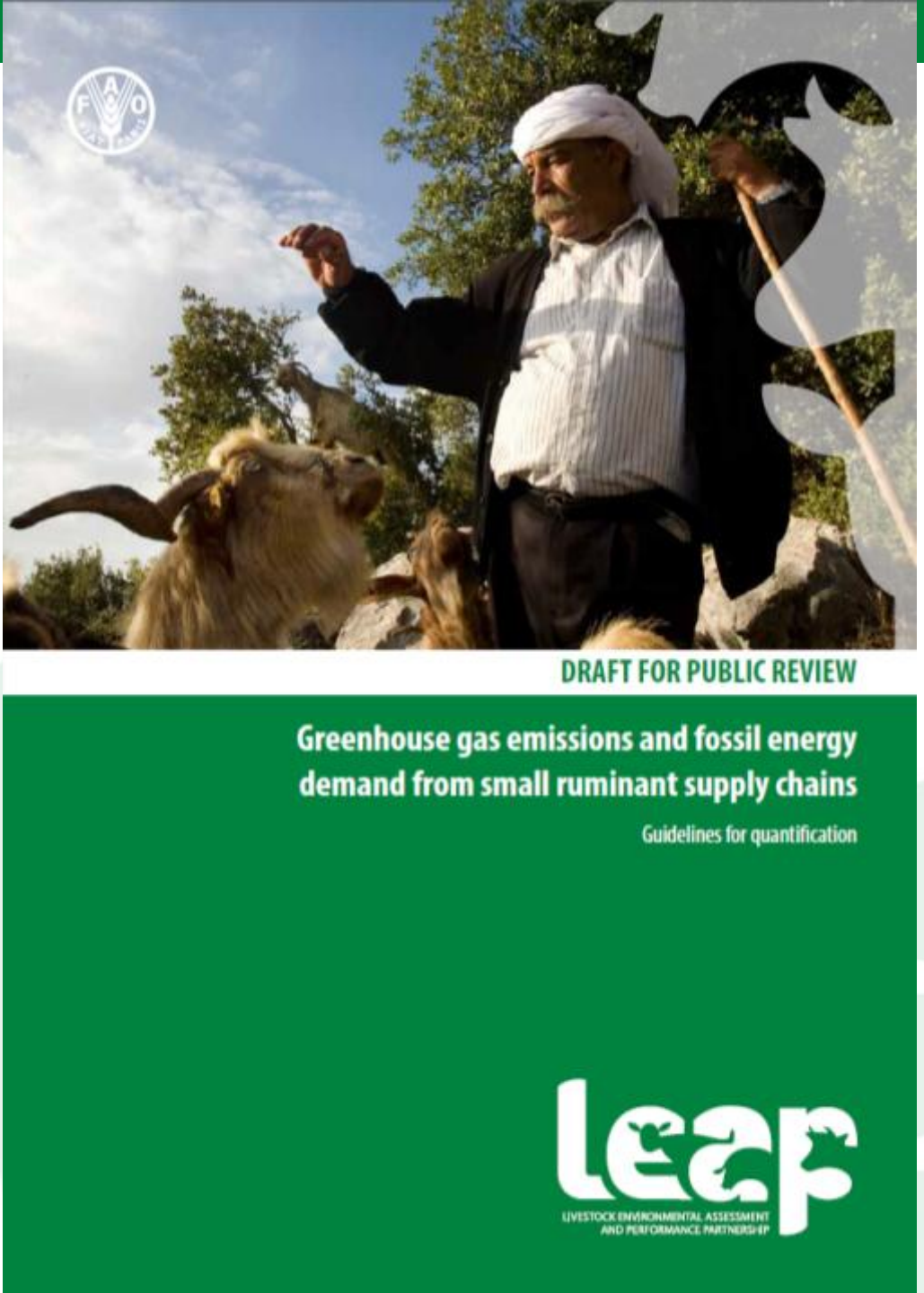
	Functional Unit (weight of product)	System Boundary	Qualifying characteristics
Meat	Live weight	Farmgate	Specified carcass yield
	Carcass weight	Processor loading dock, or equivalent	Specified edible yield
Egg	Fresh, shelled weight	Farm gate or processor loading dock	Specify shell mass
	Liquid weight	Processor loading dock	Yolk, whole, white
	Dry (powder) weight	Processor loading dock	Yolk, whole, white

Multifunctional Processes / Allocation

- On-farm:
  - Multiple animal species: separate systems / biophysical growth requirements
  - Spent breeders / layers: system expansion (substitution) by relevant broiler production
- Processing:
  - Meat products (undifferentiated edible portion) and other co-products: economic allocation.

Advice to practitioners

- Diversity of production systems
  - Terminology issues: Conventional, commercial, free range, organic, colonial, and differences both within country and between regions; adopt terms in glossary for consistency
- May need adaptation for specialized systems
- Data availability for developing regions, small scale production – some default values available, seek region-specific information.



Webinar: Introduction of Guidance for Small Ruminants

4 June, 2014



Small Ruminants
Technical Advisory Group

Stewart Ledgard, Beverley Henry,
C. Devendra, Marc Benoit, Armelle Gac, Chris Lloyd,
Hans-Peter Zerfas, Jean-Baptiste Dolle

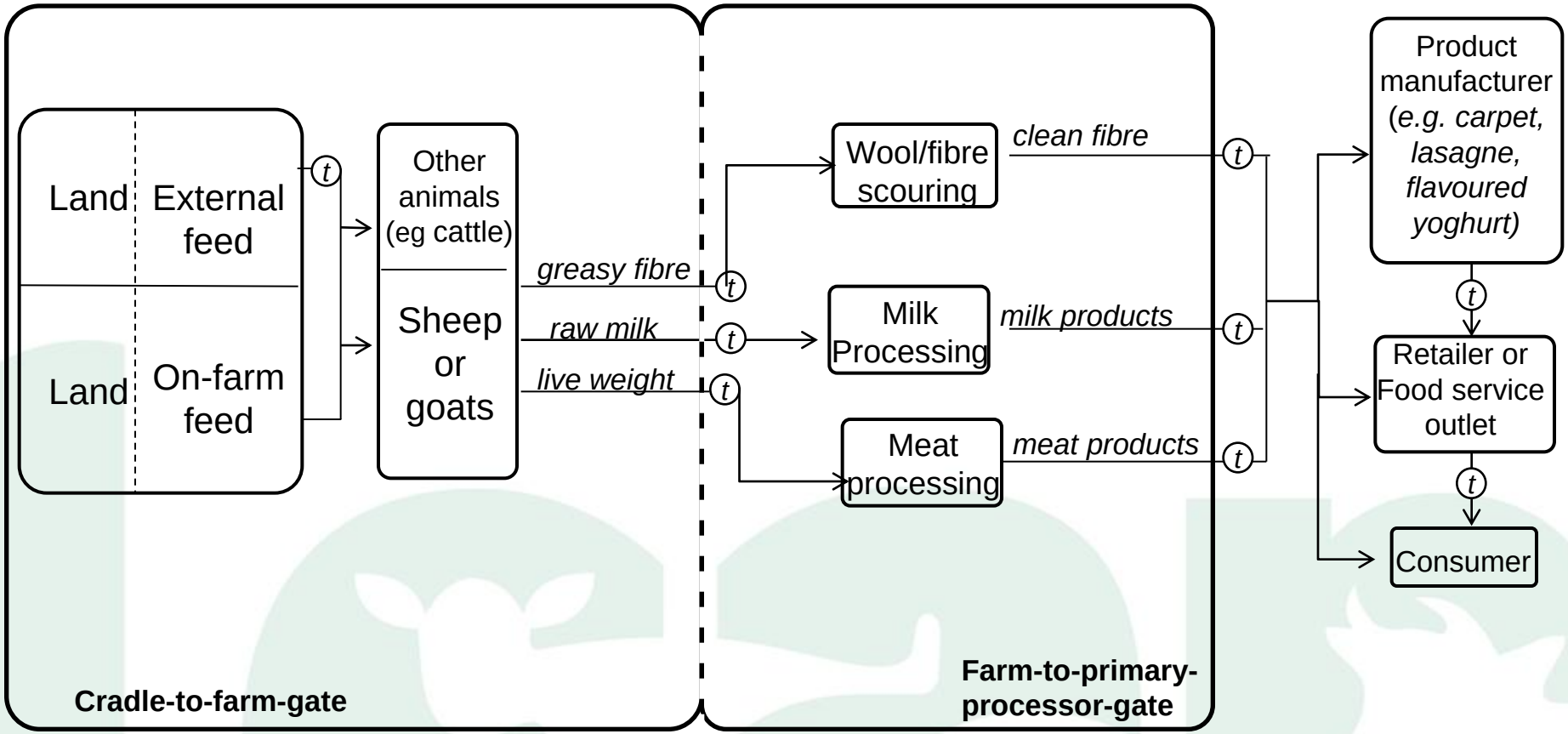

Outline

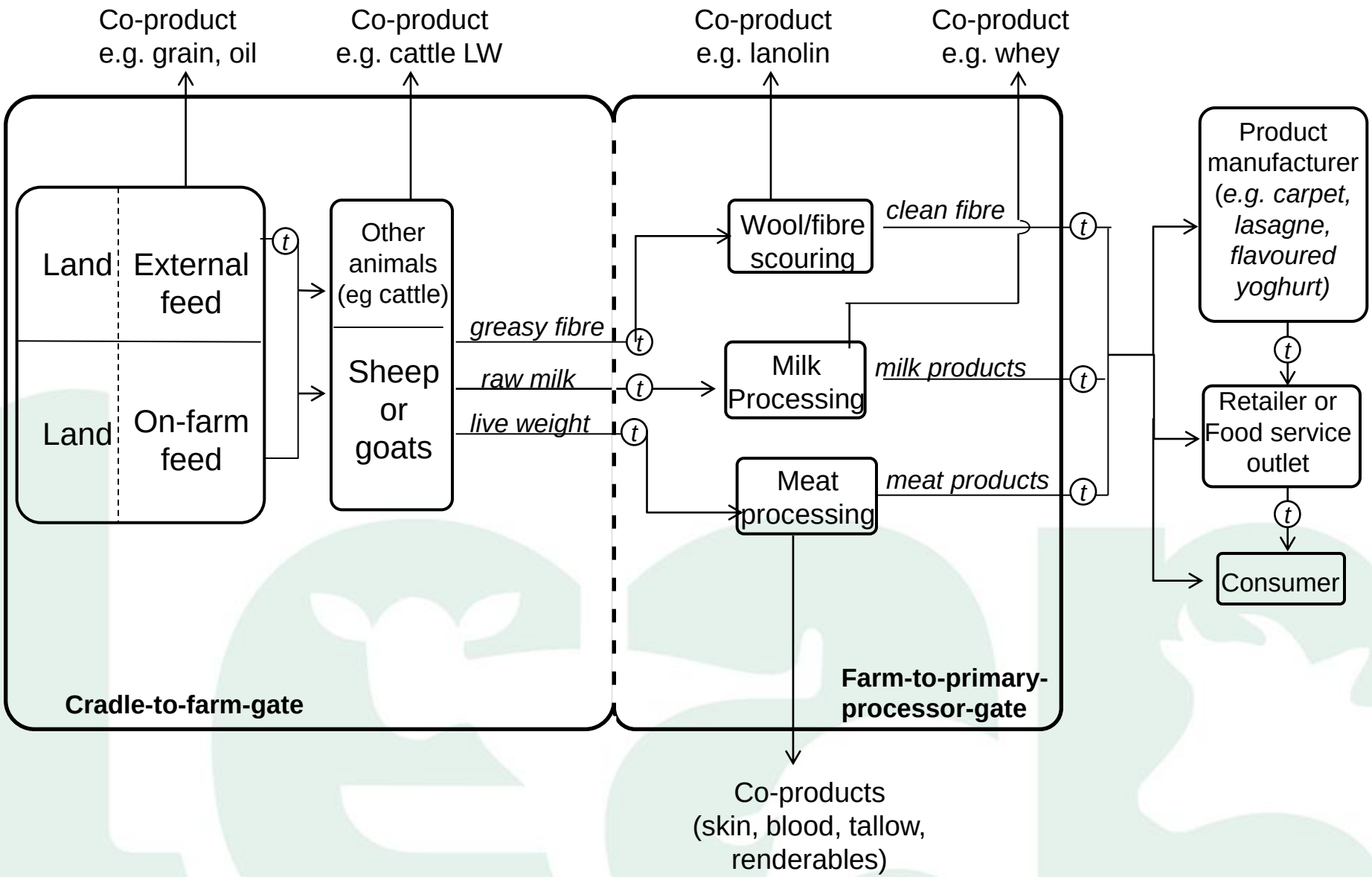
- Guidelines – Introduction
- System boundary
- Handling co-products/allocation
- Accounting for feed intake
- Lessons learnt

Small Ruminant Guidelines using LCA

- Sheep and goats only
- Products (Functional/Reference Units)
  - meat, milk, fibre
- Environmental performance (Impact categories)
  - GHGs, fossil energy demand
- System boundary (cradle to primary processor)

System boundary diagram




Co-product
e.g. grain, oil
Co-product
e.g. cattle LW
Co-product
e.g. lanolin
Co-product
e.g. whey
Land
External feed
Land
On-farm feed
t
Other animals (eg cattle)
Sheep or goats
greasy fibre
raw milk
live weight
t
t
t
Wool/fibre scouring
clean fibre
Milk Processing
milk products
Meat processing
meat products
t
t
t
Product manufacturer (e.g. carpet, lasagne, flavoured yoghurt)
Retailer or Food service outlet
Consumer
t
t
Cradle-to-farm-gate
Farm-to-primary-processor-gate
Co-products
(skin, blood, tallow, renderables)

Accounting for co-products

Recommended method of allocation

On-farm:

Animal species **biophysical (based on relative feed intake)**

Meat/milk/fibre **biophysical (based on feed requirements)**

Accounting for co-products

	Recommended method of allocation
On-farm:	
Animal species	**biophysical** (based on relative feed intake)
Meat/milk/fibre	**biophysical** (based on feed requirements)
Processing:	
Milk	**fat+protein** (use relative fat+protein in products)
Fibre	**economic** (relatively unimportant; lanolin ~2%)
Meat	**economic** (cuts/CW/offal treated as equivalent; hide, blood, tallow, renderables)

Key sources/hot-spots:

Cradle-to-farm-gate ~80% life-cycle GHG

Rumen enteric methane 50-80% farm-gate GHG

Excreta/manure ~20% farm-gate GHG

Key sources/hot-spots:

Cradle-to-farm-gate ~80% life-cycle GHG

Rumen enteric methane 50-80% farm-gate GHG

Excreta/manure ~20% farm-gate GHG

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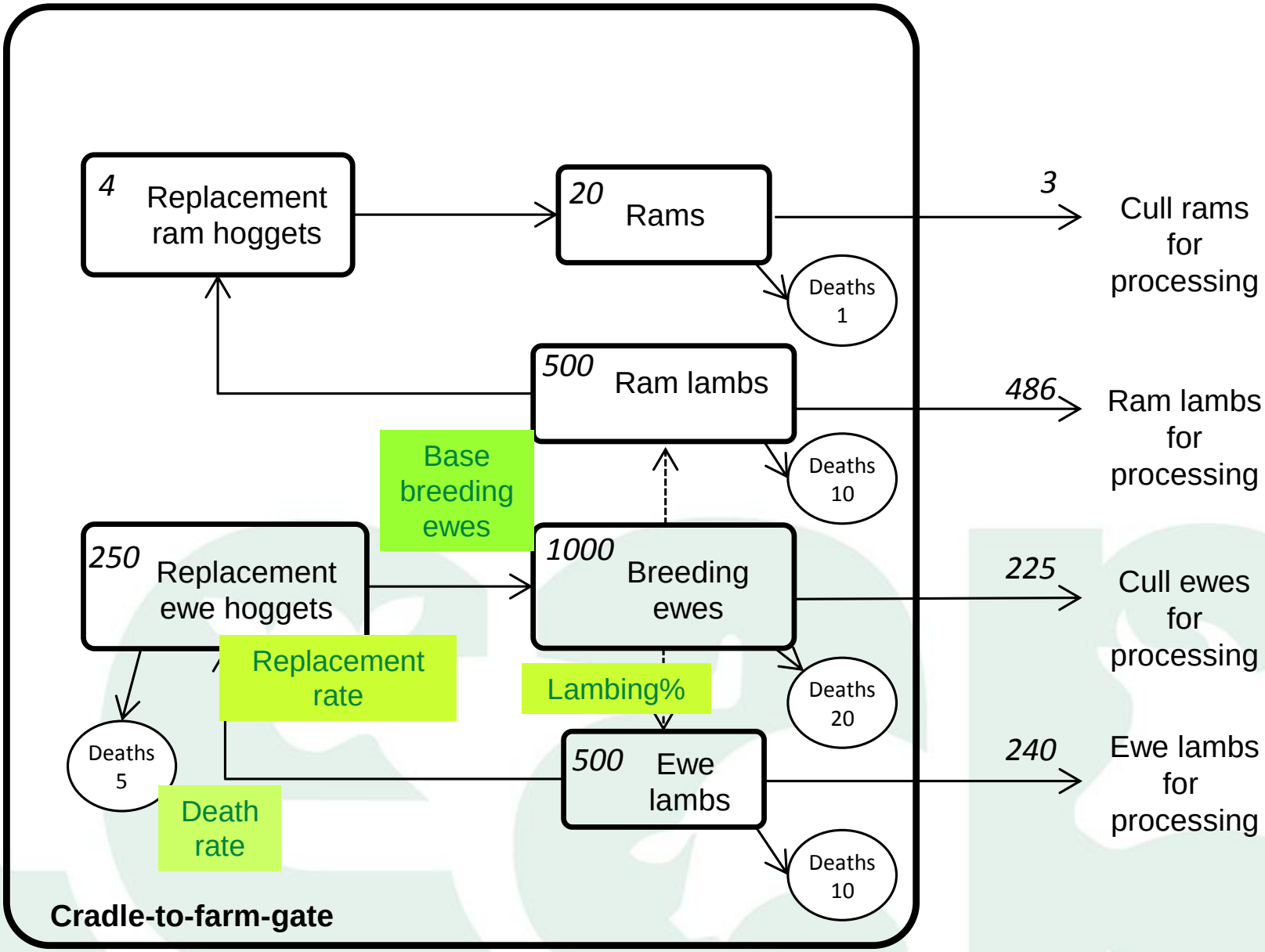
Key determinant is feed intake

For most systems: Calculate feed intake using animal energy requirement model

- needs animal population & productivity data

Defining animal populations



Model for feed requirements (Tier 2)

Basic animal productivity data:

- male and female adult live-weight,
- live-weight of animal classes & age at slaughter,
- fibre production, and
- milk production (where milk is a product that is sold)

Lessons learnt

- Importance of involving sector and wider groups to recognize the diversity of systems and ensure practicality of methodology
  - & the need for compromise!

- Recognizing possible data limitations
  - hierarchy; region-specific 2° data

- Importance of appropriate methodology when aim is to define benefits of GHG reduction options

DRAFT FOR PUBLIC REVIEW

Environmental performance of animal feeds supply chains

Guidelines for quantification

leap

LIVESTOCK ENVIRONMENTAL ASSESSMENT AND PERFORMANCE PARTNERSHIP

Webinar: Introduction of Guidance for Feed

4 June, 2014

Feed Technical Advisory Group

Theun Vellinga, Hans Blonk, Carolyn Opio, Nicolas Martin, Salil Arora, Bruno Caputi, Hans Luttikholt, Ben Lukuyu, Harinda Makkar, Thumrongsakd Phonbumrung, Raghavendra Bhatta, Sophie Bertrand, Li Yue, Anna Flysjö, Paul Crosson, Heinz Meissner

Process and Content

- Building on existing methodologies and standards and on practitioner experience
- Application and extension of flexible and modular approach to handle wide diversity of production, but as prescriptive as possible

Stepwise analysis

- Goal and scope should be defined first.
- Irrespective goal and scope we defined:
  - System boundaries
  - Reference flow
  - Allocation preferences
  - Environmental impacts

System boundaries

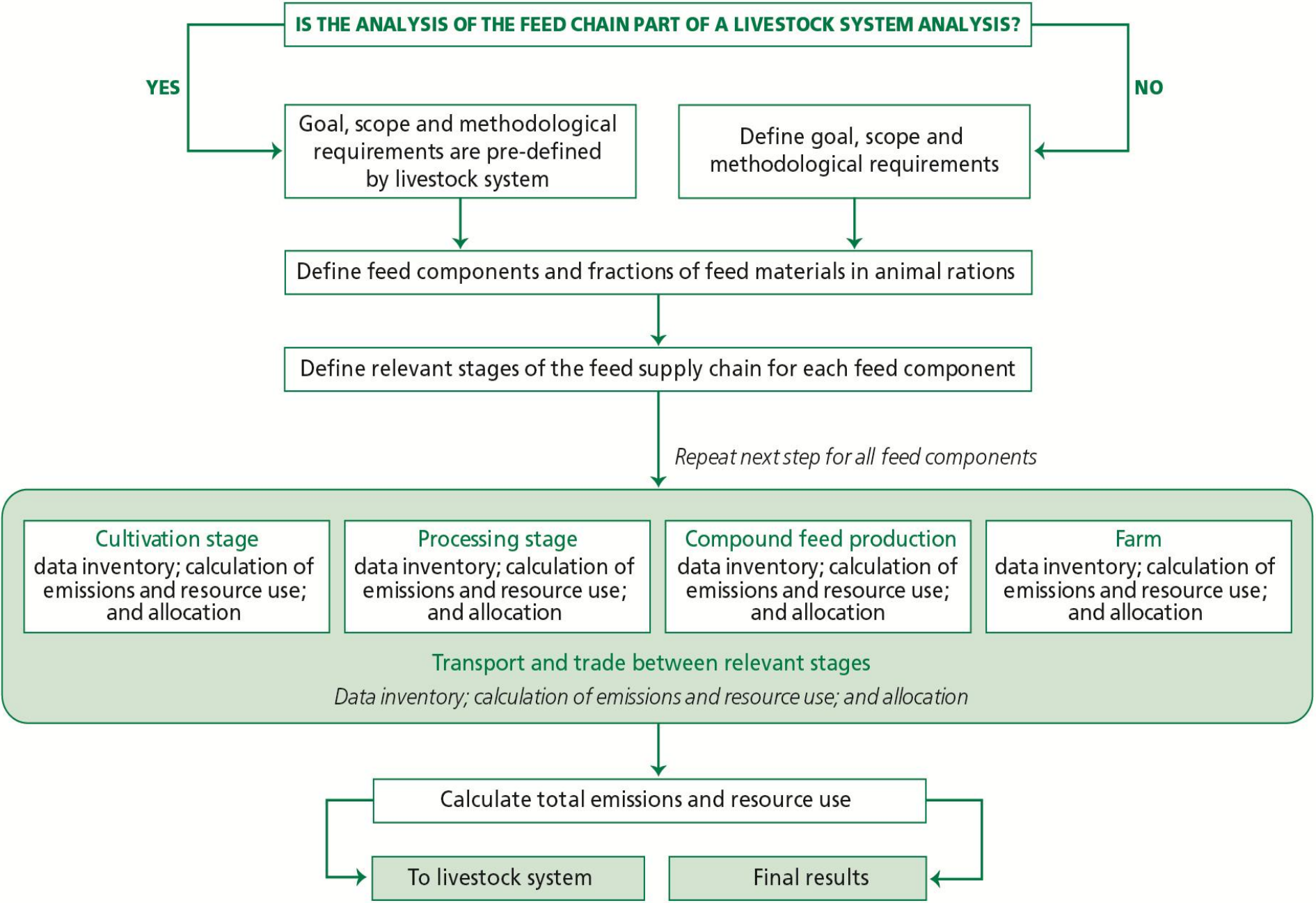
- System boundary
  - Cradle-to-the-animal's-mouth
  - Internal system boundaries to deal with variation
- Modular approach:
  - feed production,
  - processing,
  - feed compounding
  - feed preparation at the farm,
  - *transport & trade linking the different stages*

Reference flow

- One kg of feed material as is
- Attributional information
  - Dry matter content
  - Gross energy
  - List of predefined feed characteristics, suitable for ruminants, pigs and poultry

Allocation

- ISO rules:
  - Avoid it, system expansion/substitution
  - Physical properties
  - Other relationships
- Economic allocation preferred
  - Various physical properties
  - Cannot be captured in one physical model (yet)
  - Price reflects complex of physical properties
- Apply alternative allocation options for comparison and sensitivity assessment.


IS THE ANALYSIS OF THE FEED CHAIN PART OF A LIVESTOCK SYSTEM ANALYSIS?
YES
NO
Goal, scope and methodological requirements are pre-defined by livestock system
Define goal, scope and methodological requirements
Define feed components and fractions of feed materials in animal rations
Define relevant stages of the feed supply chain for each feed component
Repeat next step for all feed components
Cultivation stage
data inventory; calculation of emissions and resource use; and allocation
Processing stage
data inventory; calculation of emissions and resource use; and allocation
Compound feed production
data inventory; calculation of emissions and resource use; and allocation
Farm
data inventory; calculation of emissions and resource use; and allocation
Transport and trade between relevant stages
Data inventory; calculation of emissions and resource use; and allocation
Calculate total emissions and resource use
To livestock system
Final results

STEP 1

Collect data on inputs and resource use, emission factors and parameters for emission models on farm/factory level

STEP 2

Calculate emissions and resource use

STEP 3

Allocate inputs, emissions and resource use to **production units** (if the farm/factory level have more than one)

STEP 4

Allocate inputs, emissions and resource use to co-products and divide emissions by the yield

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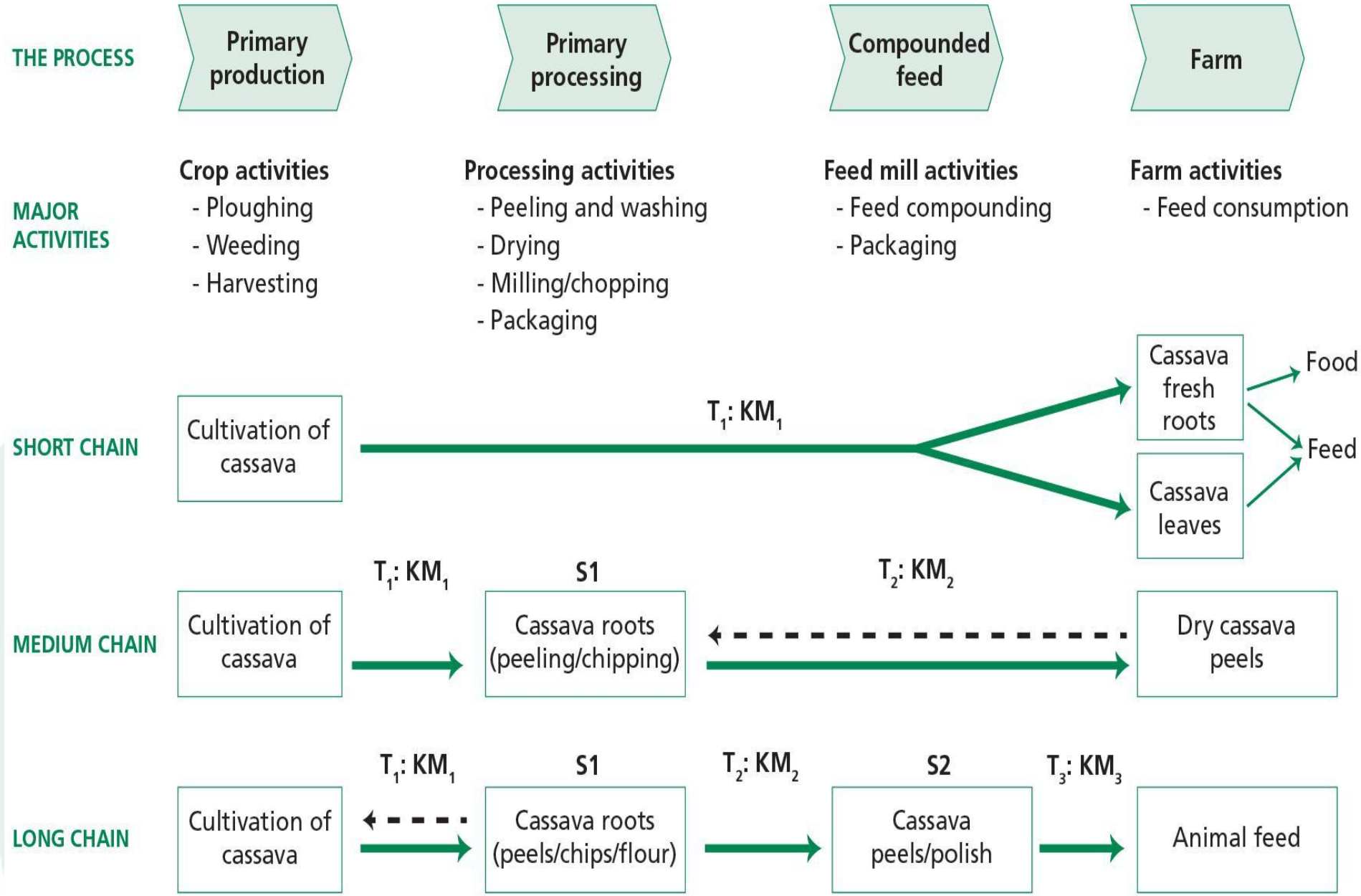
Emissions per kg of (co-)product


THE PROCESS
Primary production
Primary processing
Compounded feed
Farm
MAJOR ACTIVITIES
Crop activities
- Ploughing
- Weeding
- Harvesting
Processing activities
- Peeling and washing
- Drying
- Milling/chopping
- Packaging
Feed mill activities
- Feed compounding
- Packaging
Farm activities
- Feed consumption
SHORT CHAIN
Cultivation of cassava
T1: KM1
Cassava fresh roots
Cassava leaves
Food
Feed
MEDIUM CHAIN
Cultivation of cassava
T1: KM1
S1
Cassava roots (peeling/chipping)
T2: KM2
Dry cassava peels
LONG CHAIN
Cultivation of cassava
T1: KM1
S1
Cassava roots (peels/chips/flour)
T2: KM2
S2
Cassava peels/polish
T3: KM3
Animal feed

Land Use and Land Use Change

- Not one consistent methodology
- Large variation between methodologies
- Methodology often combination of scientific and political/policy approach
- Not manageable at farm level

- LULUC shall be assessed, reported separately
  - Create insight in importance and in wide range
  - Compare at least two methods
    - Global average (top-down) method (Audsley/Vellinga)
    - Crop/country based method (PAS2050)
- It's about understanding, no blame game

Lessons learned

- There is a large variation in systems
  - Guidelines <u>can</u> deal with that
  - Ask for the variation and show it!
- It's teamwork; organise it,
  - Some members will not contribute automatically
  - You need input! Face to face meetings will help
  - You need co-authors and people for reflection
- It's not (all) new
  - Copy and refer to previous work and standards
  - Most work is on structuring guidelines

Webinar Format

- Introduction to the LEAP Partnership
- Introduction to each guideline document by the TAG Leaders
- **Comments from stakeholders on what the guidelines mean to them**
- Review process and next steps
- Q&A session – please submit questions as we go
- Wrap-up

LIVESTOCK ENVIRONMENTAL ASSESSMENT AND PERFORMANCE PARTNERSHIP

Introduction to LEAP
Life Cycle Assessment Guidelines

www.fao.org/partnerships/leap/public-review/en/