Notes from an Expert Consultation to develop a comprehensive livestock environmental assessment framework
Stockholm, 23-24 October 2013

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Background

Following the rapid increasing demand for animal source foods propelling livestock production, particularly in many less developed countries where the pressure on natural resources is mounting, the need for a "pragmatic tool" to assess environmental impacts is greater than ever. With funding from the Bill & Melinda Gates Foundation (BMGF) our group is during an 18-month project, CLEANED LVCs*, taking stock of existing environmental assessment methods to formulate a new comprehensive framework. The outcome should be an approach that is applicable for rapid environmental assessment of existing, or planned, livestock production. Proof of concept will be shown by a pilot study testing the framework for smallholder dairy production in East Africa.

The expert consultation 22-23 October in Stockholm aims to anchor the framework within the scientific community, and to exchange ideas between peers working towards improved sustainability of livestock production systems. The main outcome of the meeting will be an increased joint understanding of what a generic pragmatic environmental assessment framework can look like. The intention is to document the meeting consensus in a joint synthesis paper to inform a wider audience.

During the two day workshop we will present the CLEANED LVCs progress to date, with an overview of existing methods and the suggested new multicurrency framework. In a step-wise process different building blocks of the framework will be examined, and alternative approaches discussed.

*__C__omprehensive __L__ivestock __E__nvironment __A__ssessment for Improved __N__utrition, a Secured __E__nvironment and Sustainable __D__evelopment along __L__ivestock __V__alue __C__hains.

Day I - 23rd October - A New Generic Framework

1. Introduction

This expert consultation took place in Stockholm from 23-24 October 2013 and was part of an initiative addressing livestock development and environmental impacts led by ILRI, SEI and CSIRO. It was seeking expert input in the development of a new generic framework for ex-ante environmental assessment of livestock value chains. The specific objectives included:

- Validating the overall environmental assessment framework and approach
- Refinement of the framework and indicators for an East Africa dairy environment

2. Session I – Framework presentation

2.1. A first list of environmental impacts

The meeting began with an interactive introductory session. The aim was to not only get to know each other but also to get an indication of specific expertise and background each brought to the room. A quick survey among the participants resulted in the following list of most important environmental impacts.

Votes	Impacts
IIIII	Nutrient cycling
III	Land use
II	Feed production
II	Water use
II	All environmental impacts
II	Land degradation
I	Water pollution
I	GHG emissions
I	Food waste
I	Reduce losses
I	Resource use
I	Land use that results in loss of diversity

2.1 Reflections to the framework

The meeting then proceeded with presentations from the team members. At first the project rationale and structure was explained. Subsequently, reviews of environmental impact assessment methods and LCA studies were shared. Then an overview of a new framework was presented, with four key dimensions:

a) value chain modules
b) spatial scales
c) temporal scales
d) environmental impact categories

The participants were split into groups to try and define these four dimensions and determine the most important aspects to measure within these four dimensions.

General reflections to the initial presentation of the framework were captured in an open group discussion. Some comments:

- Put emphasis on categories rather than value chain steps
- Refrain from broad categories in terms of resource use
- Phrase them in positive rather than negative terms
- To which users? Why this small list? Connected to audience?
- Food losses must be highlighted
- FAO studies of post-harvest losses in EA dairy point to more than 30 % of production
- Circulation – nutrient circulation
- Food/feed coupling to come into the environmental baseline
- What is a constraint, and what is not?
- "Bad thing" for who?
- Policy makers or scientists to be the users?
- How to include range of intensity in systems, like grazing, mixed and intensive?
- Biodiversity – difficult scientifically.
- Resources use vs. Land use
- What will be the environmental consequences, and what will be the importance of these?
- Relative vs. absolute change of environment
- Pass critical limits
- Productive capacity of land.
- The end user will decide what the message should be.
- Crop-livestock systems – not only livestock systems.

3. Session II - First group breakout – The Framework

The participants were divided into three groups and given the task to answer the following questions:

a) Who will use this type of framework?
b) What would such a tool produce, or be used for?
c) Does the overall framework make sense? What is missing?
d) How long would a "rapid" tool optimally take a user to implement?

Q1: Who will use this type of framework?

Group a):

- Pretty much everyone. Extension agents, farmers, donors, banks, big funders that have potential to invest in development projects.
- Industry wants a tool to use on farm level which results in an economic calculator/number, private sector.
- Banks

Group b):

- It is not to be developed for everyone at the moment. It is important to clearly state: Who are the users?
- If we aim for big interventions it needs to be stated
- Professionals involved in Research for Development (R4D)
- Farmers to know where they stand vs. sustainability
- Policy makers
- Intervention programmes – What is sustainable? To set a pathway.
- Farmers e.g.
    - producing environmentally "sound" beef
    - Direct marketing to consumers

Group c):

- If it was available now, TetraLaval would use it in Bangladesh.
- SIDA is requiring environmental impact assessments.
- **Development investors.**
- Tetraval already has interventions on ground, but now wants to scale up.
- **Not a framework for farmers**! If it's for assessing environmental impact of different kinds of interventions aimed at livelihoods and income, then no need to express it in a way that a farmer him or herself will need it.
- CRP Livestock and fish would use it for stakeholders looking for red flags and political instabilities. Example: starting in Uganda, looking at pork value chain. What will be the impact of smallholder vs. industrial pig production system? Stakeholders: **researchers**, **government**, **private sector**, **farm organizations**. Where are there **red flags**? For private sector, what concerns about political sustainability of their system/investment going forward.
- **Not for scientists**! Develop it to give outputs in terms of: good/better/worse

Q2: What would such a tool produce, or be used for?

Group a):

- This tool could help to build a business case with a green aspect to it.
- Donors want to evaluate projects that are submitted to them.
- For smallholders it can be used to show that being environmentally sustainable will also benefit economy.
- It is useful for the private sector if they do not already have tools of their own.
- To bridge the gap/needs between the private and public sector and create communication between them.
- To stimulate awareness among farmers/NGOs/extension agents that being environmentally friendly is also economically sensible in most cases.
- For local stakeholders to gain a more holistic understanding of their actions and management practices at farm level.
- Awareness or environmental safeguards in the way people are thinking is an important part of development of this framework

- We need a tool that is adaptable to local context. Screening of the environment.

Group b):

- Do we talk about environmental impacts per system or per land unit? Or do we assess impacts per kg product? Tool should give both. To give options for well informed decisions.
- Options and way to find pathway between production vs. environment. Trade-offs = key issue.
- Do we aim to preserve the environment or to be more efficient in terms of environmental "use"?
- Rates (e.g. 1-5) for decision makers or should it address trade-off issues. Complex! Experts can assist to transform environmental impacts to values 1-5.
- Local information must be used to set what to tell.
- Measurements of "good or bad". For example, a stream is either polluted or not.
- Nutritional goals in the background
- Positive approach needed!

Group c):

- The framework must have a baseline to compare practices. Preferably a farm or a group of farmers. If the tool is to be scaled up prevailing practices, will have negative impact. Can we use this as an argument for targeted investment? Counterfactual is a possible development.
- Two possible modalities: Baseline & BAU
    - Change a production system in a specific place or type of system.
    - Put pro-active investment in place to avert future impacts.
- Look at the current system, then estimate the impact of a particular intervention, then compare interventions.
- Who decides the levels of red/green/yellow?
    - Can look at direction of Pre- and Post- interventions: better, worse, same.
    - Make as a decision tool, so can challenge the colours.
- Support an evidence-based discussion of alternatives.
- How it is used will depend very much on how the outputs are presented visually (bigger spider diagrams).
- Conveying the message: Who could pick that up?
- How far would the parameterization go?
    - A methodology?
    - Or parameters already calculated?
    - Test with baselines. How generic are they?
    - Depends on the user and how the output will be used
    - Example:
        - Start in Uganda
        - Almost nothing in the pork sector
        - A couple of modern farms, mostly smallholders 1-2 pigs each
        - An opportunity for pro-poor pig production

        - So want to do this, but will generate more waste, raise public health issues, environmental problems: Which ones should we pay attention to?
        - Would have some specific intensification options on the table.
    - Could a Tier 1/Tier 2/Tier 3 approach work to answer the questions? We have to decide for each indicator, and clearly indicate when things need to be measured.
- Will the tool provide a checklist? Could be sent with a consultant to the field, who would fill it in. Different assessments at different scales. Must be possible to be done by a non-scientist.
- Is this an Excel tool? Who is being prepared for? Well…pretty scrappy to start with. Can use Open Data Kit (ODK).

Q3: Does the overall framework make sense? What's missing?

Group a):

- The framework needs to be all the more positive! E.g. talk about "balances" and not scarcity and pollution.
- It is important that both an illiterate farmer and donor can use it.
- The framework should not be developed only for and at an academic level. The team need to work on the fact that this framework should be communicated to people/groups at all levels.
- How to communicate to a target group?
- The key thing is to achieve something "in a short time". This will have down-sides, and will have up-sides. The simplification to use, must rest on research.

Group b):

- Yes it makes sense. Focus on prioritization in terms of missing parts.
- Key is to give environmental information and give a baseline
- It makes sense, as it is scalable; it captures value chains, and consists of different modules. To be as integrative as LCA – but with less data.
- It should be "updatable", i.e. to be able to include new ways to assess environmental issues.

Group c):

- The modular aspect of the framework is good, and good to communicate. Degree of resolution is good.
- It needs to be able to capture stocks and flows. This will be in the details.
- What would we expect, and want to see as environmental impact as a reference? What is the benchmark?
    - Standards are problematic, but need to anchor somehow.
    - But it is problematic to specify anchors. Maybe compare to neighbours?
    - **Could do: Colours for comparison with baseline situation plus dashed line for reference countries?**
    - Point is to compare…so need same "currency".
- General approaches:
    - Set targets? **No**
    - Best practice/reference countries?

    - Compare to baseline: up/down/no trend
- Baseline and also theoretical counterfactual, and then use for monitoring with same indicators. *Can* use that way – and wanted by donors! – but:
    - ex ante: modelling
    - Ex post: measurement (often) [but can also be modelling]
    - A bit like comparison of apples & oranges
- One approach: Ranges. Different systems have different ranges. Position yourself within a range of comparable systems. That tells you where you might move. Put upper limit on sustainability based on more theoretical literature.
- Number of impact categories;
    - Four is good for graphical presentation
    - But might hide information that users should be able to see
    - Depends on how it's presented – interactive possible?
- Must include land-use implications: How is feed produced? Not enough connection between crop/breeding/animal links.
- Must be able to capture landscape matrices/landscape configurations. Can't just focus on quantities that can be aggregated by a simple sum.
- Visual tools, such as maps? Or FRAGSTATS? Or similar?
- What about financial sustainability of interventions? Will it continue in the future? What is the environmental impact after the funder leaves? Out of scope? Or a necessary part of an environmental assessment? Really need to bring in the rest of your team. Could we have a decision support tool that lets me weight my criteria? Depending on my weights/decision tree? This is second generation. First generation is impacts. But need to think about user and how (s)he makes decisions.
- It is good to have illustrative outcomes but need to be comparable
- Helps to do the pilot study but some of the parameters just have to be measured
- Have to be done by a non-scientist
- Baseline. Can you use it for monitoring. Make sure you separate ex-ante and ex-post
- Land use implications beyond the farm are important
- Must capture spatiality

Q4: How long would a "rapid" tool optimally take a user to implement?

Group a):

- Screen 10 farms in a day
- Once baseline data is obtained it should be possible to do four or five analyses in a day. If expert opinion for input data is available assessment should take less than a month
- Time frame will be set based on what baseline data is available.
- For a rapid assessment expert opinions on rough inputs should be used
- It is a resource issue. Limitation of resources decides how quick it can be done.

Group b):

- The group stranded - If an example was given – let's say increasing dairy production by x and x. That is not happening tomorrow but will build up over years. So where is the rush?
- 6-12 months of analysis is not too bad!

- How much information is there? Complexity of case study? Sets the time frame
- Dynamic tool because established research change
- Environmental modelling should be the same across, but livestock would differ in the value chain

Group c)

- If stakeholders are involved, must give time for engagement
- If done by a graduate student: maybe a few hours over a couple of weeks.
- Perhaps 1 month

4. Session III - Second group breakout – Framework 'deep dive'

Who needs/would use a rapid EIA tool? What would such a tool produce/be used for?
Does the overall framework (building blocks) make sense as an approach to populating a tool? Are the 4 dimensions and 2 steps it comprises the right ones? What is missing to make this framework comprehensive?

In the second group session three new groups were formed to address three dimensions of the framework:

a) Environmental impact categories
b) Scales – temporal and spatial
c) Value chain components

Each group aimed to answer the following questions:

a) Does the goal CLEANED aims for make sense?
b) What is most important?

Group 1: Environmental impact categories

Biodiversity discussions dominated this group session.

- Biodiversity is not so relevant for the farmer, but critical in the whole livestock sector.
- Some issues:
  - Breeds of cattle, pastures, native pastures to sown pastures
  - Land sparing discussion and deforestation
  - Overfishing to produce feeds.
- Taking biodiversity out?
  - It is difficult (to put money on) and it doesn't play so much for food security.
  - It is critical and contested in the livestock intensification discussion (local cattle breeds, from native pasture to sown to cropping, wild biodiversity, land clearing/deforestation, below-ground biodiversity, overfishing, feed production), important at higher scale

The group also got into discussions about scale issues. First important scale is the farming scale – they care about the long term productivity of the soil and land use, soil health at the farm scale.

- Preserving the long-term productivity of the farm (resource use efficiency)
  - Soils & land degradation
  - Nutrient cycling
- Regional environmental assets (people in the landscape)
  - Water quality and water depletion
  - Land use
- Global environmental issues
  - GHG emissions
  - Biodiversity

Reflection from the plenary discussion:

- What about below-ground biodiversity?
– The human health aspect is missing!

Group 2: Scales, spatial and temporal

Specific indicators will be linked to specific spatial scales, and some to more than one spatial scale. This is important to capture and keep in the visualizations.

Temporal scales:

- The first scale is farm scale (field is implicit in the farm scale). It is here decisions are made.
- Second: Country and regional – setting the market.
- Global scale: Not important for unit of analysis, but for content of impacts.
- Landscape – important scale. Problems of definition! What is the landscape? Practitioners? Basins?

Temporal scales:

- Years: 1 – 10 , 20 – 25 and 50
- 10 – Development and planning stage
- 20-25 - makes sense because adoption of interventions is at this scale
- 50 for some of the climate change and carbon sequestration

Reflections from the plenary discussion:
- 50 years and global scale is connected
- look into French literature for landscape scale
- Ground water resources are not captured in the basin level

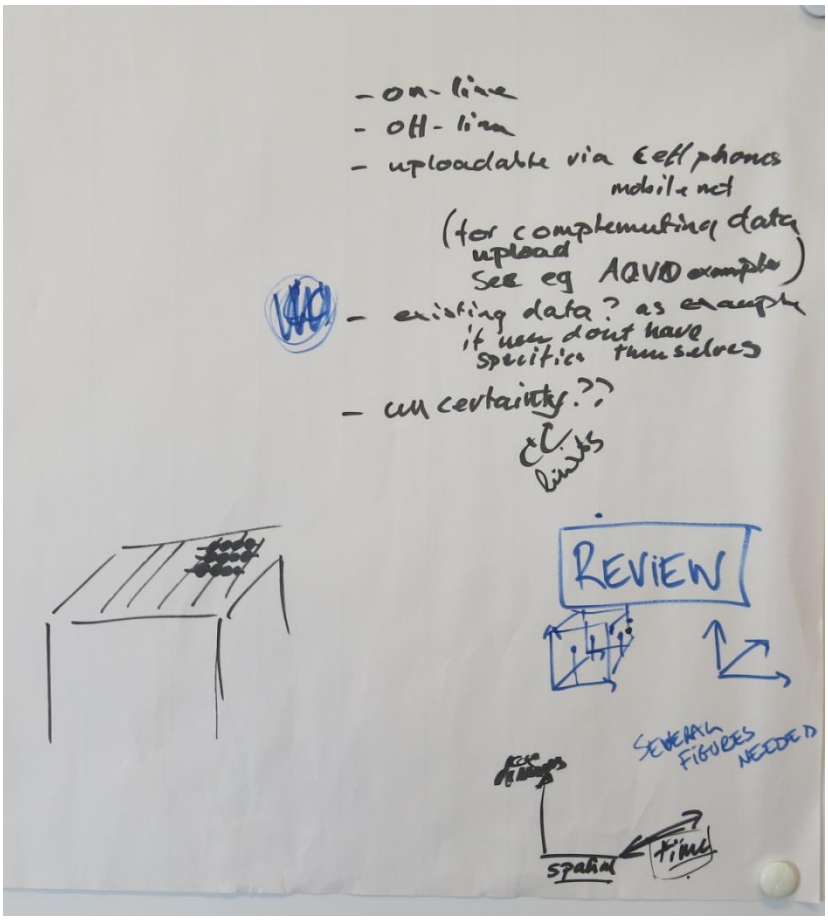
Group 3: Value chain modules

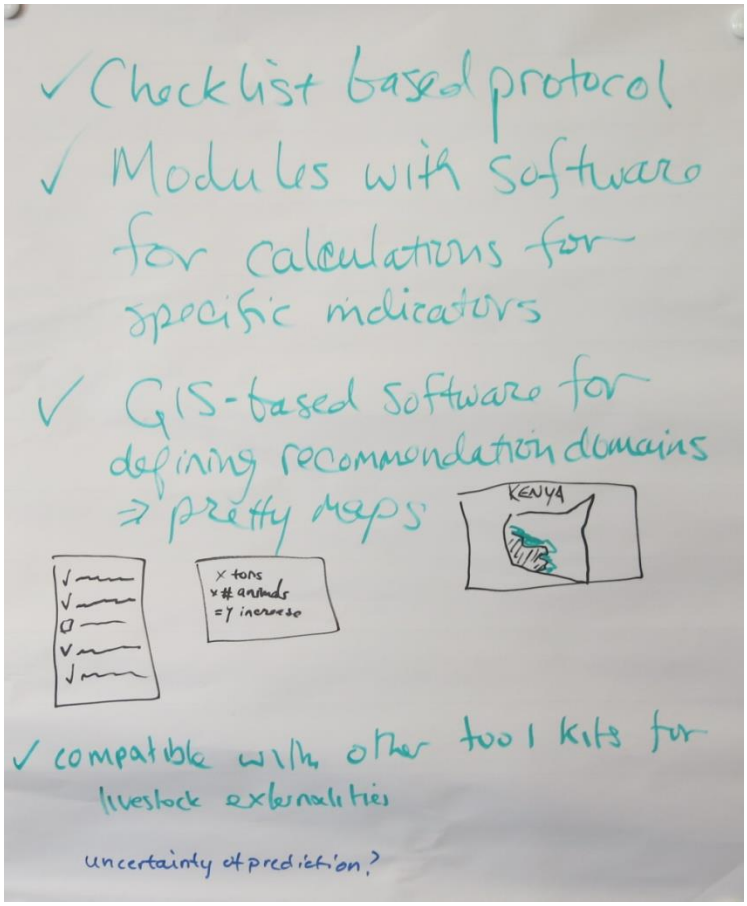
- Inputs and feed production module.
- Risk of double counting along the value chain
- Could set out some guidelines on how to involve stakeholders along the chain. May not be feasible in all chains but clear guidelines would be good to have.
- Being able to take a closer look into a particular stage of value chain and elaborate on that data would be essential
- Important to draw on previous work on the value chain.
- Important to do this before working further on the framework.
- Value chain perspective adds to the losses along the chain.
- Many indicators along the value chain will be challenging

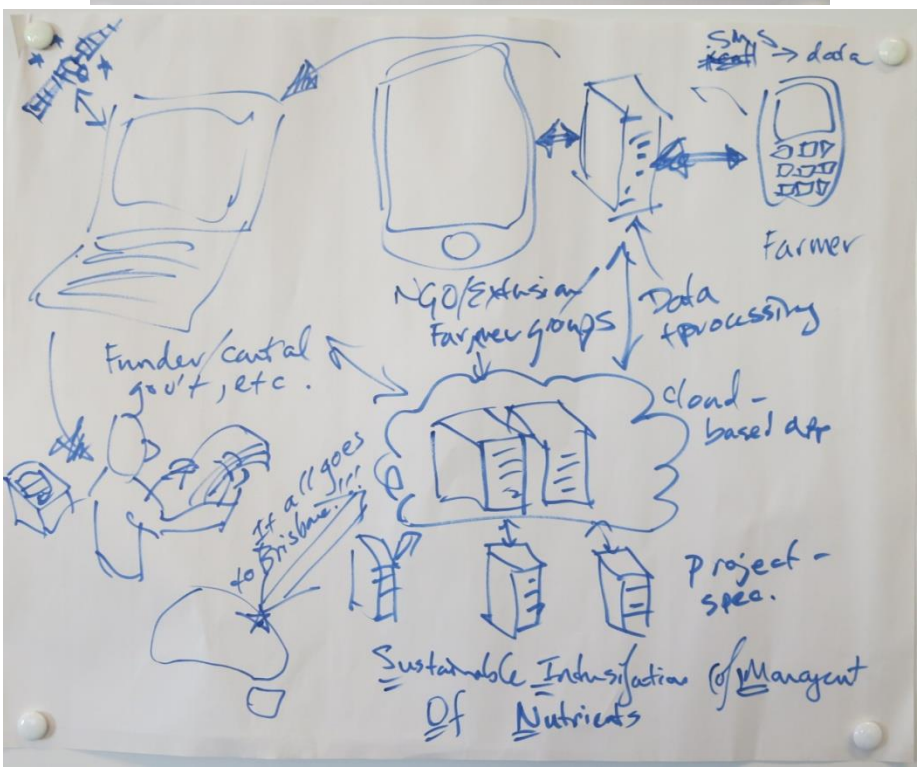
Reflections from the plenary discussion:
- Before analyzing the value chain we have to know the value chain! It will be different depending on the context
- Landscape works best in the value chain context if the product is of specific origin. There is a term for it – “food shed” (a sub-catchment).

5. Networking activity: What might assessment tool look like?

Before dinner all participants gathered in the lobby to brainstorm around what a livestock and fish impact assessment tool would look like. The thoughts were captured on flipchart sheets.




✓ Checklist based protocol
✓ Modules with software for calculations for specific indicators
✓ GIS-based software for defining recommendation domains
⇒ pretty maps
KENYA
× tons
× # animals
= γ increase
✓ compatible with other tool kits for livestock externalities
uncertainty of prediction?


Sms → data
Farmer
NGO/Extension/ Farmer groups
Data processing
Funder/ central gov't, etc.
cloud-based data
If all goes to Brisbane...
project-spec.
Sustainable Intensification of Management Of Nutrients

Day II - 24th October - East Africa Smallholder Dairy Production

6. Session IV - The framework applied to Dairy in East Africa

After a brief recap of day 1 and presentation of the plans for day 2, a presentation on smallholder dairy in East Africa was given from ILRI Nairobi by Ben Lukuyu and Isabelle Baltenweck.

Diverse livestock farming systems and market conditions in East Africa

- Who produces most of the milk?
- Smallholders dominate!
- Only half sell their milk regularly.
- Key dairy markets are mostly informal. Unprocessed milk (90% is sold as raw milk)

Possible and current interventions

An in-depth discussion around interventions took place, with questions from different participants and replies from Ben Lukuyu and Isabelle Baltenweck.

Technologies:

- Feed: improve use of crop residues; concentrates (inc.re-allocation); calf start; improved fodder
- Animal health: Vaccinations, parasite control and curative health
- Breeding: Artificial insemination and community bull schemes

Institutional and organizational innovations for service delivery:

- Hub approach and franchise inputs and services delivery mechanisms; SIDAI, Farm shop (quality)
- Enabling policies – For example: recognizing the informal market
- To train and certify milk traders
- To expand in the feed sector – there is a lot of informal feed and this is not recognized in the nations. Therefore difficult to control types of feed released in the market

Question: Cost structure? What would it look like if you break down the various costs? Farm gate prices?

- Map large areas where farmers have poor access to markets and then statistics on farmers and then presented the interventions that seemed to be only successful for those with market access.
- Would you see the same trends for those with no market access?

Question: What are the incentives for farmers to produce more and better? Are there incentives for milk producers to improve quality in the informal market? Will they get better milk-prices also there? Are there interventions also on connecting farmers to the formal markets?

- Traditionally people consume milk and milk products (especially Kenya). Demand for milk and milk products is there. The major challenge is to connect farmers to formal or informal markets
- In contrast, in Tanzania there are no, only weak, milk traders or milk markets.
- Formal vs. informal milk markets. Informal markets are still dominant. It will take more than 10 years to shift to formal markets.
- It is about finding the balance – in some areas there is not enough supply of milk and therefore no incentive for a cooling centre (that require a certain value of milk).

Question: Feed stall systems are increasing. When we think about environmental impacts of different systems, how does this trend impact the flows of feed and manure? How far from the farm do they get the feed? Trade of feed? Scale of biomass across landscape or region? How does this link to the economics of these enterprises? Is manure included in the profitability of the farming? Do they sell it? Value?

- Most small-holders will grow crops and keep livestock. After harvest they use crop residues. So most is used in farm and between neighbouring farms.
- Crop residues trading in Kenya is very common. Because of the severe feed quality. The possibility to improve feed quality is huge!
- Both residues and planted fodder is traded in East Africa
- Cost and benefits of most technologies show that some technologies are not profitable at a single farm, better done on large scale (especially silage etc.)
- Some technologies show positive return: like feeding concentrates, high quality fodder.
- With regard to manure. In these system there are two types of systems:
    - Zero grazing where manure can be kept, managed and used.
    - Extensive systems where animal housing is not common. Then cattle drop dung wherever they are grazing and manure will then be managed according to grazing patters

Question: Gross margins: How do they coincide with the rest of the farming practices? Twice as high? With these numbers many farmers should shift to dairy production. So, what are the constraints?

- One big issue in dairy: milk is a very important factor, but if you want to do it in a commercial manner you need to do breeding, more care, more feeding. Also, not all the milk is sold but consumed at home. Dairy not so attractive among young farmers.

Question: Farm scale nutrient flows: Inorganic fertilizer inputs for the crops?
The use of inorganic fertilizer on the farms is very low because the cost is very high. Small-scale farmers seem to rely on manure. Imported to the farm?

- Intensive systems manage their manure. Some farmers buy manure from other producers. This is most common on high value vegetable farms that has their markets in Nairobi.
- Crop residues, feed and manure storage? Crop residues storage is a large problem because large volumes cannot be stored.

Question: Number one environmental impact for dairy in East Africa?

- Move from large herds to smaller herds of better milking animals. Less carbon emissions because fewer animals will be producing the same quantity of milk?
- Reduce GHG emissions.
- Grazing habits that affect the soil and soil conservation
- Poor grazing management degrade land
- Poor manure management (related to stocking rates)

Question: Are typologies very important?

- Models are available. Although – models are theoretical – only helps understanding.
- What are the dynamics? And what about those environmental parameters?

Reflections from the room:

- Odd test case since much of the information is already collected. In many cases this might not be the case. That should not be forgotten!
- Systematic errors of data. Feed is not measured. It is given in "buckets". Milk yields are estimated from bottles. And based on yesterdays' milk yield.

- Can go towards estimating a lot of environmental impacts without a lot of data collection
- Modelling can be made for nutrient balances and GHG emissions
- Water pollution and land degradation – what to look at?
- Just balance the nutrients easily. There are many other concerns that cannot be measured easily. Put emphasis on them! E.g. land degradation and land use; water use and water pollution; and biodiversity.

7. Session V – Environmental Impact Categories

In the last break-out session four groups were formed:

a) Land
b) Nutrients
c) Water
d) Losses

The focus of the session was for each group to address two questions for their respective environmental impact category:

a) What needs to be assessed (indicators)?
b) How might it be estimated/assessed (approaches, data sources)?

Group 1: Land

a) What needs to be assessed?

- The characterization of this group will form the base for the other groups.
- farm survey to obtain the baseline on Feed production at farm level – data on various crop yields, land use history, fertilization practices land pattern. ie. patches of grazing land and rotation and time, and chain of feed sourcing
- Baseline data available at the landscape scale from remote sensing on land use and land cover change, biomass production, water quantity and quality, soil erosion and degradation,

animal distribution. Ensure data is not global layer because we need something that we can sufficiently find data on

- Underlying data and algorithms of on-farm production. ie Number of animals, category of animals – stocking rate, composition of feed basket, assess productivity for efficiency calculation, data on weights, age of slaughter milk production, duration of milking.
- Inputs: fertilizer, imports,
- State: land allocation, NPP, stocking rate
- Management: cropping patterns, tillage,
- What is the indicator of land degradation?
- Normalized Difference Vegetation Index (NDVI) is not the solution.
- First indicator is overgrazing
- Soil Organic Matter (SOM)/erosion? Have been done in a 2-3- day workshop. Survey approach to get data of SOM. For land degradation

Question: Do we need history or only baseline?

- Ideally we need history but we will not get that.

Question: Do you have to choose things that actually attribute to the livestock systems? E.g. land degradation is a popular topic used by many people. Little data is available and what if this is bound to livestock? What is feasible? What not? Concentrate on nutrient balances?

- Hence a lot of these environmental dimensions link back to the feed basket.
- Thus, the feed basked needs to be very accurately captured.

b) How might it be measured?
Starting at the farm level. It is an initial survey

- Threshold levels – when do the environmental parameters cross a threshold?
- Red light for land degradation: What is the issue?
- Yes, you need to go down to the diagnosis
- We need something that gives back to the farmers.
- Ideally an on-line tool that requires as little from the farmers as possible.
- That is though a landscape issue.
- Five interventions for improving food security is a farm level issue.
- Then it is not a table anymore, it is a flow chart!
- Decision tree based on existing modelled data
- BUT – this is only one use case! There are many use cases.
- Farm survey

Question: Am I hearing that you see it less as a farming tool?

- Yes if it supposed to be fast
- It needs to be decomposable at different scales

Question: Can you think of it as a larger scale tool?

- Farm scale and landscape scale
- How to capture “downstream farm gate”? “Displacement effect”

- Environmental components usually modelled or collected expert opinions.
- Include losses of e.g. biomass in each step and in terms of not getting back to the field, and not getting back to the farm.
- Least losses in small-holder farmers in development countries

Question: Further down the value chain can you identify any impacts?

- There was no comprehensive reply to this question
- Important to capture trade-offs in terms of what affects you have outside the farm. Otherwise the tool will be too simplistic!
- Downstream after farm gate – no environmental impacts in terms of land

	Farm level	Upscale at landscape level	Rest of the world	Biodiversity. Big word. What do we want?
Feed	Areas, crops, yields, land use history, fertilization statistics, feed purchased/sourcing, land patterns including pastures, rotations	Remote sensing, biomass production, water quality, (erosion…) Animal distributions No global layers Over time as well to assess LUC	Displacement effect (through feed for e.g. deforestation in Brazil)	Endangered species, protected landscape, permanent vegetation cover
Animal husbandry practices	Stocking rate, feed baskets, productivity/production to calculate efficiency (weight, age at slaughter, milk production, and lactation period). In some regions we need also low productivity			Soil biodiversity, above/below ground? on farm: crop diversification, crop spatial patterns, canvas or homogenous, domestic species conservation (breeds)
Indicators	Stocking rate with relation to carrying capacity Land/feed use efficiency GHG emissions	Grassland carrying capacity and stocking rate (same farm level	Displacement effect	Land cover/land use, crop diversification

Table 1: Land use issues

Reflection from the room: Not entirely captured soil health and nutrient balance, habitat loss, land competition of resources, genetic biodiversity of breeds
How do we balance between broad brush vs detailed almost academic research on biodiversity, organic matter, emissions or more?

Group 2: Nutrients

a) What needs to be measured (indicators)

- Farm N balance (total inputs vs. total outputs)
- Farm P balance (total inputs vs. total outputs)
- Soil organic matter
- Run-off measurements

Inputs:

- Fertilizer
- Feed
- Manure
- N fixation
- Bedding

Outputs:

- Products leaving the farm
- milk
- meat
- increase in livestock weight
- crop products including cash crop and crop residues along the value chain, sort of biomass distribution typology (import export of biomass) environmental losses

Issues raised

- N2O – not particularly interested in where it happens, but with nitrate leakage since that can locally contribute to eutrophication
- If importing Soil Organic Carbon (SOC) from rangeland area to cropping part of the farm an imbalance within the farm need to be captured
- Side-effects from farm 1 increasing SOC but at the cost of another (in terms of importance of inputs, biomass etc.).
- Inefficiencies in the system

Methodologies

A number of modelling techniques

- On-farm data
    - Cropping sequence, tillage practices, manure storage number of animals etc
    - feed and emission data
    - SOC makes you have to consider turnover time in soils etc.

Question: Cropping sequence: Can we get that through characterization and typology and then using that to model impacts on distribution of nutrients?

- Global implication of feed: how to view foreign actors.
- Where is the soy coming from? Do we want to go up the value chain again?
- If aquaculture is to be included this is VITAL

Question: IPCC Tier 1 and Tier 2. Useful or misleading?

- You need to have background data from the farm.
- Emission factors from tier 2 are pretty crude.

- Local factors are of course preferable.
- Quick and dirty + expert inputs and you can get typologies in a day.
- If you really want to know what is going on you need to do a proper survey.

What is the specific purpose of this work? Show potential warning lights? Or modify perfect carbon numbers…

- Look how successful the sustainable livelihood framework was? It does not look at indicators, but tells what subsystems to look at.
- Idea of typologies, indicators, and value chain components are really important for the framework!

Group 3: Water

Water quantity and quality across production chains.

- Water quantity
    - For feed:
        - Green vs. blue. Only focus on irrigation or also rain fed?
        - Report volumes of irrigation (probably it has to be local data)
        - Scarcity and local supply of water (also local data)
        - Evapotranspiration and potential evapotranspiration where green water can be modelled accounting for the total volume going through . Water partitioning in landscapes.

Comment: For quick and dirty: Existing models or crop coefficients

- Livestock:
    - Livestock production
        - Modelled based on typologies and climate
        - Chilling plant and processing, marketing and consumption.
    - Processing:
        - All the upstream water going in?
        - Process water use
        - Cleaning
    - Marketing
        - Cleaning and hygiene.
        - Electricity supply, packaging, cleaning products manufacturing
    - Consumers stage
        - Is minimal compared to other stages.

Comment: LCA databases a source of information

- Water quality:

    - Nutrient losses and balances are important of what is going on for water quality. Can be modelled!
    - Sediment load (there are models. More site specific, but you can get some number for larger landscapes). Other option is to go qualitative with broad chunks of information.
    - Pesticides are almost irrelevant in Kenya but potentially elsewhere.
    - Same for antibiotics.
    - Biochemical Oxygen Demand (BOD).
    - Livestock all the way to consumption:
        - Impacts from discarded milk. From local data
        - Possible sources of water pollution: processing ,chemicals and water, cleaning chemicals,
- Indicators
    - Water quantity:
        - Availability of water per animal/person – characterisation of water scarcity issues etc.
        - Volumetric nutrient loadings
        - Quantities especially in water stress situations – risks of depletion of water resource
        - Vague to calculate water use per unit of product in the value chain. Clarification of why it is vague?
        - How is the significant water use along the value chain?
        - Value of evapotranspiration in terms of WUE per production of feed unit.

Comment: Water use efficiency is an environmental concern in terms of what it cannot do. It can't restore ground water, river, soil moisture

Group 4: Losses

Two categories:

a) Milk loss

- From farm throughout the chain
    - Spillage
    - Calf usage
    - Rejected milk (due to e.g. antibiotic residues).
- On the farm
    - Characterize the milking system, e.g. technology – Milking system typology
    - Data on how much is lost
    - How much sold
    - Consumed
    - Given away
    - Household consumption during wet and dry season
    - Changes throughout seasons.
- Each time milk changes to another container there is a risk of loss.
- Transportation is a risk of loss (but the waste might not be significant).

    - However, interviewing traders would be an interesting and important part of the assessment.
- Waste management systems at processing stage.
    - Their waste over the year
- Consumer waste.
    - On the wish list and possibly very important.

Question: Do you look at the fate of the waste? Important issue! Does it go back to the farm? Is it washed away?

Sampling size: first we need to have detailed characterisations of the farms and value chains. That informs on sampling and aggregating. On farm we would ask to do an inventory of what milk is not sold. What is consumed, wasted, etc. etc.. Idea of the quantity that is lost in these different ways. This is conducted as an interview. 32 interviews at farm level

b) Feed loss

- Exactly the same method for the processers and the traders and the milk stakeholders.
    - First question: Is this bought or self-produced
- The same procedure is done for feed.
- Important to characterise feed – here typology
    - Bought
    - Self-produced

Question for the group: Is it important for this method to know how much feed is used for other things than going to the cow?

- Animal losses!
- Cattle mortality
- Energy losses
- Feedback to farmers in terms of losses for different market options etc..
- A survey can be tapped to a typology. Meaning you need to survey every farm type and value chain

Question: Why 32?
It is the bare minimum to have a significant data.

Losses will have to be surveyed as data does not exist, and the accumulated data will be sufficient to forms the basis for future analysis without doing a survey.

Fish perspective

Since the aim is to develop a tool for BOTH livestock and aquaculture, Sarah Castine from WorldFish presented a short list of issues particularly important for aquaculture.

- Energy very important, e.g. for pumping water

- Fish meal in feed
- Genetic pollution due to escape of fish stock
- Spread of pathogens and diseases
- Antibiotics
- Into water supply/water bodies
- Into feed
- Salinization due to shrimp farming
- Clearing of ecologically important mangroves
- Different impacts on biodiversity
- Damage to seabed
- Nutrient releases, especially from carnivore aquaculture systems

8. Session VI – Stocktaking

During the last session small groups of 3-4 participants were formed. Based on the insights from the 2-day workshop final reflections on how a framework should look like were reported.

Philippe Lecomte & co:

- Effective tool that could be rapid to use
- Not to make an assessment but to help understand what is happening in this environment of impact
- Not only include the informal sector but also formal. Should be more open!
- Risk in testing it in a data-rich environment. We rather need to test it in a data-scarce setting
- People are expecting not just a framework – they expect a tool!

Ulf Magnusson & co:

- Safeguarding system
- Like the layout with scales and typologies
- Broad or robust and easily understood indicators
- High temperature/fever or whatever à then dig deeper in that matter!

Brad Ridoutt & co:

- Brief about safeguards
- Rapidly screen with this comprehensive tool
- Through up warning signs
- If this is the case - a lot of the metrics we talked about don't seem to be an environmental impact. Using energy is not an environment impact. Energy efficiency doesn't mean anything to me but important for cost structures.
- Need to go through parameters and see which ones lead you to what you need to consider.

Myles Fisher & co:

- Objective to influence policy/decision makers – look at water and food research for development
- Used innovation platforms to involve decision-makers

- They are not represented here
- Need continued stakeholder engagement
- Turning outputs into outcomes is a necessary requirement

Michael Peters & co:

- Rapid and flagging
- Testing – how it is applied for the purposes
- Typologies can be heterogeneous and complex and is crucial to find the right types

Mats Lannerstad & co:

- Do the traffic light approach
- Target group cannot understand the content – need a simple signal
- We should not go for full perfection – start simple and go further
- How generic can it be?
- Jo Cadilhon proposed more models – still generic but not use anything
- Reach stakeholder engagement

Tom Randolph & co:
What should come out of this:

- What do we need to have as an agenda?
- What are the important pieces of research?
- From a value-chain perspective

9. Participants

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