ESTIMATING LIVESTOCK GHG EMISSIONS IN NATIONAL INVENTORIES

Andreas Wilkes

April 2021
Estimating national GHG emissions

Some background
Why improve GHG estimates?
How to improve GHG estimates?
A few key lessons
Some background

International requirements for MRV

**Measurement**

2006 Guidelines

**Reporting**

<table>
<thead>
<tr>
<th>Current system</th>
<th>Paris Agreement Transparency Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Communication every 4 years (incl. GHG inventory)</td>
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</tr>
<tr>
<td>Biennial Update Report (every 2 years)</td>
<td>Nationally determined contribution</td>
</tr>
<tr>
<td></td>
<td>Biennial transparency report every 2 years (incl. GHG inventory, NDC accounting)</td>
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</tbody>
</table>

**Verification**

<table>
<thead>
<tr>
<th>Current system</th>
<th>Paris Agreement Transparency Framework</th>
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<tbody>
<tr>
<td>International consultation and analysis for BUR</td>
<td>Technical expert review (incl. GHG inventory)</td>
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</tbody>
</table>
Some background

International requirements for MRV

GHG inventory
Quantifies annual GHG emissions

NDC
Quantifies emission reductions compared to business-as-usual

Reduced GHG emissions

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Reduced GHG emissions
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Methods for estimating livestock GHG emissions

Tier 1

Only general categories (beef cattle, dairy cattle)

Fixed emissions per animal, does not change over time, and is the same in different production systems
Some background

Methods for estimating livestock GHG emissions

Tier 2

More detailed classification of animals

Changes as animal characteristics, management or performance changes

Changes as diet quality changes

Intake/Animal × Emissions/Intake

Number of animals

Estimated from key productivity measures

Can change over time

Use default or country/diet-specific values if available
Why improve GHG estimates?

Policy drivers in Kenya

Relative distribution of emissions by sectors

- Agriculture sector: 41%
- Industrial process sector: 18%
- Energy sector: 18%
- Solvent and other product use: 0%
- Land-use, land use change and forestry: 37%
- Waste: 2%
Policy drivers in Kenya

NDC target for agriculture: 2.77 MtCO$_2$e by 2030
Why improve GHG estimates?

Policy drivers in Kenya

KENYA DAIRY NAMA (NATIONALLY APPROPRIATE MITIGATION ACTION)
$240 million investment in dairy development, targeting 15% of dairy producers in the country, ca. 8 MtCO$_2$e emission reduction in 10 years

\[ y = 81.868x^{-0.436} \]

\[ R^2 = 0.4307 \]
Why improve GHG estimates?

Policy drivers in Kenya

- Kenya’s NDC
  Tier 1 as the basis for projections >> Tier 2

- National GHG Inventory
  Tier 1 >> Tier 2

- Kenya Dairy NAMA
  Tier 2 MRV system
How to improve GHG estimates?

Process in Kenya

01/18
- Consultation workshop

06/18
- Planning workshop

11/18 – 03/19
- Collect & analyze reports & data
- Draft inventory
- Quality control to identify any errors

04/19
- Make corrections
- International review

05/19
- National review workshop
- Submission by State Department of Livestock to environment ministry
How to improve GHG estimates?

Institutional arrangements

Submit livestock inventory

Core team (6 people):
SDL Climate Unit
Inventory manager
MoEF inventory officer
UNIQUE

Consult, review, provide data
compile inventory

Advisory group (ca. 15 people):
Kenya Bureau of Statistics
Livestock experts: KALRO, Tegemeo, Egerton Uni....
ILRI

Consult, review, provide data

Coordinate, request data
compile inventory

MoEF

AFOLU inventory working group
Quality assurance, compile agriculture inventory

SDL
How to improve GHG estimates?

Data issues

Classify animal sub-types

Characterise animal performance and its change over time

= Intake/Animal × Emissions/Intake

Number of animals

Can change over time

Estimated from key productivity measures

Use default or country/diet-specific values if available
How to improve GHG estimates?

Animal sub-categories

<table>
<thead>
<tr>
<th>Animal type</th>
<th>Intensive</th>
<th>Semi-intensive</th>
<th>Extensive</th>
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<tbody>
<tr>
<td>Dairy cow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heifer 1-2 yr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult male ≥3 yr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growing males 1-3 yr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calves 0-1 yr</td>
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Data sources:
1. National data on total population only, so used literature data to estimate herd structure
2. No national data on % of cattle by production system, so used expert judgement to allocate each county to one production system
How to improve GHG estimates?

Animal performance

Live weight for dairy cows in the intensive system
1990s: no live weight data
2018: Survey measured heart girth for 372 cows
Large breeds (H-F, Ayrshire): Average LW = 372 kg
Other breeds: Average LW = 317 kg

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<tr>
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<th>1998</th>
<th>2008</th>
<th>2018</th>
</tr>
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<tbody>
<tr>
<td>% Friesian or Ayrshire</td>
<td>0.72</td>
<td>0.87</td>
<td>0.89</td>
</tr>
<tr>
<td>% other breeds</td>
<td>0.28</td>
<td>0.13</td>
<td>0.11</td>
</tr>
<tr>
<td>Weighted average live weight (kg)</td>
<td>356.63</td>
<td>365.07</td>
<td>366.12</td>
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Key point: if there is no consistent data you can use proxy indicators
Main results

Compared to Second NC (Tier 1), emissions are lower, but rise in new inventory period.
How to improve GHG estimates?

Main results

Implied trend in kgCO₂e/kg milk

How to improve GHG estimates?

Implied trend in kgCO₂e/kg milk
A few key lessons

1) Why improve livestock GHG estimates
   • NDC includes livestock as a national commitment
   • Future GHG inventory reporting will require it
   • Mitigation as a co-benefit of sustainable development strategies
   • To leverage climate finance

2) How to improve it?
   • If Agriculture or Livestock has the mandate for mitigation in the sector, there is more incentive to improve GHG quantification
   • Need livestock technical inputs
   • Use the best available data and improve over time
In conclusion

• If there is policy demand, go ahead...

• Organize institutional arrangements so that capacities in the administration and related stakeholders can build over time

• Get the structure of the inventory right so that future improvements do not require a completely new inventory

• Use the best available data and improve over time
Many thanks!

andreas.wilkes@nzagrc.org.nz