



# TIER 2 APPROACHES IN THE LIVESTOCK SECTOR: A COLLECTION OF INVENTORY PRACTICES

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RESEARCH PROGRAM ON  
Climate Change,  
Agriculture and  
Food Security



GLOBAL  
RESEARCH  
ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

# BACKGROUND

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In 2017, we reviewed 140 developing countries national communications & NDCs:

- 92 countries include livestock in the scope of their NDC
- In national inventories, only 21 use a Tier 2 approach, of which only 5 have an approach that can track change in productivity over time

## **Recommendations:**

- Review Tier 2 approaches to understand the methods used and how they evolve over time
  - Share examples of how countries are improving their national inventories
  - Enable sharing of experiences
- ➔ Tier 2 case study collection

# ABOUT THE TIER 2 COLLECTION

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**Purpose:** To share information on:

- the methods countries use in their Tier 2 approaches
- factors that shape countries' decisions
- how improvements are made over time.

**Outputs:**

- A document with overview, analysis and case studies
- A web portal that provides easy access to the information countries' need

**What we are doing:**

- Reviewed 63 countries' national inventories (livestock methane only)
- Interviews to get better insights
- Collate 10-12 country case studies, and 30+ case studies of inventory practices

# WHAT WE'D LIKE TO DO TODAY

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## Get your feedback on:

- 1) Does the content of the report answer the kinds of questions you have / meet your needs for information?  
➔ What other information needs and suggestions do you have?
  
- 2) Is it easy for you to find information on topics you are looking for, or to find out what information is in the collection?  
➔ Suggestions for how to help people better access the information in the collection (report and web portal)

# WHAT'S IN THE TIER 2 COLLECTION?

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**1. Why use Tier 2 approaches and what they are**

**2. Planning how to structure Tier 2 inventories**

**3. Data sources used**

**4. QA/QC, uncertainty assessment, improvement**

**Country case studies**

**Case studies of specific inventory practices**

# WHAT'S IN THE TIER 2 COLLECTION?

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In each section:

## (a) Brief topic overview

### Enteric fermentation and manure management linkages

Following the IPCC Guidelines (2006), Tier 2 characterisation of livestock sub-categories enables disaggregated estimation of feed intake for estimating enteric fermentation emissions. The same feed intake estimates should then be used for estimates of manure and nitrogen excretion rates in methane and nitrous oxide emissions from manure management. There are also links between the livestock characterization approach and estimation of methane emissions, because the latter should be estimated in line with the distribution of climate regions within a country (IPCC 2006 Vol 4, Ch 10, 10.41).

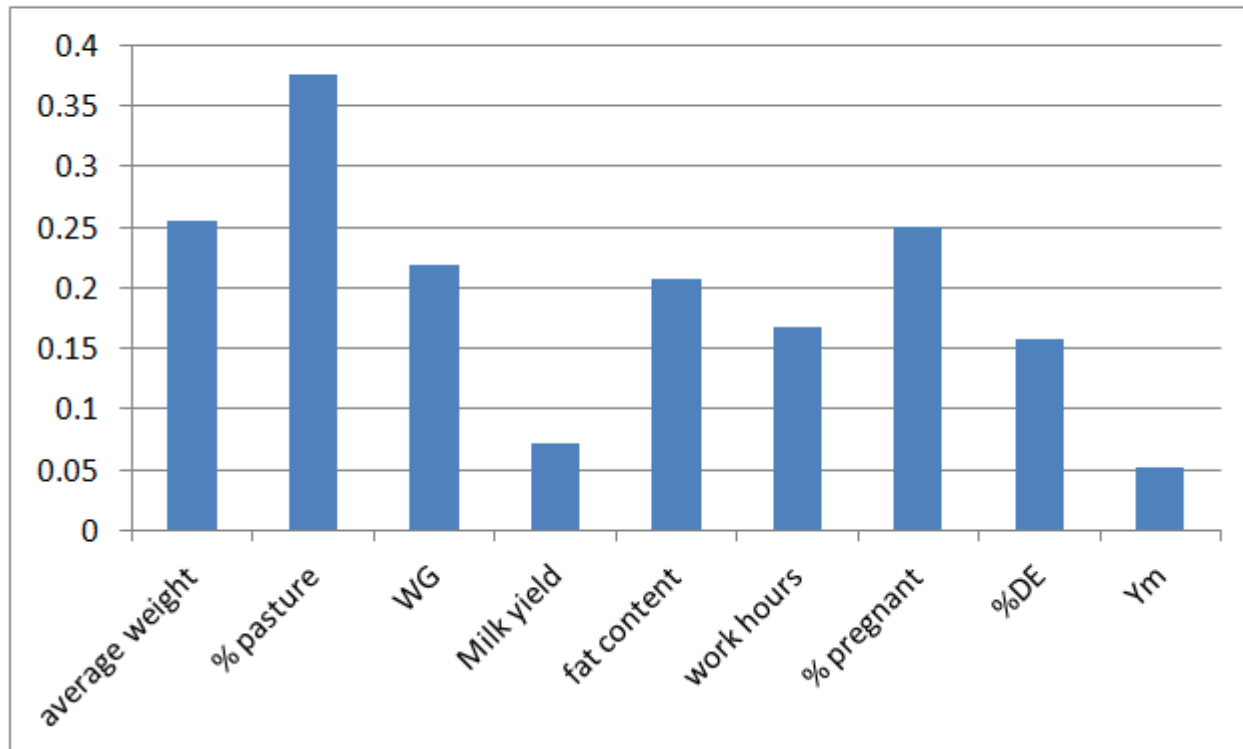
# WHAT'S IN THE TIER 2 COLLECTION?

In each section:

(a) Brief topic overview

(b) Summary from 63 inventories

**Figure 9: Proportion of countries reporting use of expert judgement as a data source for various parameters**





# WHAT'S IN THE TIER 2 COLLECTION?

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(c) Links to relevant case studies

**The use of animal recording systems, herd registers:** Feed tables and energy balance models were developed to inform farm advisory services. Service delivery often involves the collection of farm data. Other databases exist because of livestock monitoring schemes, or herd registers. These databases are sometimes used as a source of inventory data (**Country Case: Denmark**, [Inventory Practice: Estimating milk yields in Slovenia](#)). In some cases, the data available in these databases have played a strong role in influencing the methodological approach adopted in inventory compilation ([Inventory Practice: The role of cow recording systems in Norway's Tier 2 approach](#)). Herd registers have also been used to estimate the characteristics of livestock (**Country Case study: Portugal**). Statistical reporting systems are also widely used to characterize livestock and feed. Farm management surveys are also used in some countries.



# WHAT'S IN THE TIER 2 COLLECTION?

In each section:

(a) Brief topic overview

(b) Summary from 63 inventories

(c) Links to relevant case studies

(d) Links to further resources

## Further resources:

### IPCC Guidance:

IPCC (2006) Volume 4 Ch. 10

### Inventory case studies:

Inventory Practice case studies for estimation of animal weight

### Resources for collection of new data:

GSARS resources on livestock production and productivity: <http://gsars.org/en/tag/Livestock/>

ICAR Beef cattle recording guidelines <https://www.icar.org/Guidelines/03-Beef-Cattle-Recording.pdf>

Wangchuk K., Wangdi J. and Mindy M. 2018. Comparison and reliability of techniques to estimate

# COUNTRY CASE STUDIES

In each case study:

## (a) Overview

### Country inventory case study: Austria

#### Overview of Austria's current Tier 2 approach

Livestock types	Tier used for enteric fermentation (CH <sub>4</sub> )	Year adopted*	Tier used for manure management (CH <sub>4</sub> )	Year adopted*
Dairy cattle	T2	2003	T2	2003
Non-dairy cattle	T2	2003	T2	2003
Sheep	T1	-	T1	-
Pigs	-	-	T2	2003
Other	T1	-	T1	-

\*Year refers to the year of NIR submission

#### Livestock categorization method:

Dairy cattle	Non-dairy cattle	Swine
1 category	8 categories defined by: Age, physiological status, production system (organic / non-organic)	3 categories: young & fattening pigs >20 kg; breeding sows > 50 kg; piglets <20 kg.

#### Enteric fermentation

# COUNTRY CASE STUDIES

In each case study:

(a) Overview

(b) Method description

## Implementation of the approach:

For dairy cattle, GE is estimated from annual statistical data on milk yield. The EF thus changes with fluctuation between years in average milk yield, which is assumed to reflect change in the underlying diet.

*Table 125: Energy intake for dairy cattle in Austria in dependency of annual milk yield (after GRUBER & STEINWIDDER 1996)*

Milk yield	3 500	4 000	4 500	5 000
Gross energy intake [MJ GE day <sup>-1</sup> ]	214.96	227.63	240.22	252.75

# COUNTRY CASE STUDIES

In each case study:

(a) Overview

(b) Method description

(c) Data source / method improvements over time

**Table 3: Data sources used for Tier 2 estimate of enteric fermentation emissions from mature dairy cattle**

Model parameter	Data source in 2010	Data source in 2017
Average live weight	Ministry of Agriculture	Livestock Breeding Agency
Calf birth weight (kg)	Eq. 7 IPCC 1996 Ref Manual	Ministry of Agriculture
Coefficient for maintenance (Cfi)	IPCC default	IPCC default
% of time spent on pasture		
Coeff. for feeding situation (Ca)	IPCC default	IPCC default
Annual milk yield (kg)	Ministry of Agriculture	Ministry of Agriculture
Average fat content (% fat)	Ministry of Agriculture	Ministry of Agriculture
% pregnant in the year		
Coefficient for pregnancy (Cpreg)	IPCC default	IPCC default
Digestibility	Table 10.2 IPCC 2006 Ref Manual	Scientific publication
Gross energy (GE)	Calculated	calculated
Methane conversion factor (Ym)	Table 4.8 GPG 2000	IPCC 2006 GL
Emission factor	Calculated	calculated

# COUNTRY CASE STUDIES

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In each case study:

**(a) Overview**

**(b) Method description**

**(c) Data source / method improvements over time**

**(d) Uncertainty assessment methods**

# COUNTRY CASE STUDIES

---

In each case study:

**(a) Overview**

**(b) Method description**

**(c) Data source / method improvements over time**

**(d) Uncertainty assessment methods**

**(e) Further resources / references**

# INVENTORY PRACTICE CASE STUDIES

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In each case study:

**(a) Country context**

**(b) What data needs were addressed?**

**(c) Why was the data needed?**

**(d) What methods were used?**

**(e) Further resources / references**



# NAVIGATING THE DOCUMENT

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**1. Why use Tier 2 approaches and what they are**

**2. Planning how to structure Tier 2 inventories**

**3. Data sources used**

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**Country case studies**

**Case studies of specific inventory practices**

## Knowledge Portal

Home / Knowledge Portal

Use this copy to explain what users can find in this section and why it is here.

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### MRV in Practice

Explore how others have implemented their initiatives and learn from their experience.

### Case Studies

In-depth documentation that explores each step of the MRV process to help you best approach your initiative.

### Resource Library

Find the agricultural MRV tools, documentation and support you need on your journey to success.

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# WEB PORTAL NAVIGATION

Results: 6

## Filter by Activity

What are you trying to do?

Understand the Basics

## Filter by Location

Where is the focus of your activity?

Global/All

## Filter by Livestock

What are you trying to monitor?

All



Enter a Keyword

## Filter by activity

*What are you trying to do?*



Understand about Tier 2 approaches for livestock emissions

>>>

Plan how to set up a national inventory using a Tier 2 approach for livestock emissions >>>

Compile data on specific parameters >>>

Implement QA/QC procedures >>>

Assess the uncertainty of a Tier 2 inventory >>>

Continually improve an existing Tier 2 inventory >>>

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Tags: Tag A, Tag B, Tag C

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All ▼



Enter a Keyword

## MRV in Practice Link

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# WEB PORTAL NAVIGATION

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## The importance of livestock in global and national GHG emissions

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[Show More](#)

## The difference between Tier 1 and Tier 2

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[Show More](#)

## How Tier 2 can help with MRV of mitigation actions and NDCs

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[Show More](#)

## The IPCC Tier 2 model and other country specific Tier 2 approaches

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[Show More](#)

### Supporting Resources

[Resource document link display](#)

[Resource document link display](#)

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[Resource document link display](#)



# DISCUSSION TOPICS

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**Any questions for clarification?**

# DISCUSSION TOPICS

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**Group task: Discuss about these two topics:**

**(1) Does the proposed contents meet your needs for information?**

- What information needs do you have about using Tier 2 methods?
- Does the collection provide useful information?
- What information needs do you have that are missing from the draft collection?
- Any suggestions on content

**(2) How to make it easy to find information?**

- Does the proposed navigation structure seem useful?
- What other suggestions do you have to enable you to find the information you need (and useful information you didn't know you need)?

**Form groups. Choose a facilitator and rapporteur.**

**Discuss for 1 hour**

**Present your feedback & suggestions to the group**