



Food and Agriculture Organization
of the United Nations

Quality Assurance/Quality Control (QA/QC) and Verification tool

User Instruction Guide

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1. Introduction

The Quality Assurance/Quality Control (QA/QC) and Verification tool is part of the [AFOLU Emissions Analysis Tools](#) aimed at supporting Member Countries in improving their national capacity to address UNFCCC reporting requirements and to design climate policy actions (i.e. GHG Inventories, Nationally Appropriate Mitigation Actions – NAMAs – and Nationally Determined Contributions – NDCs) for the agriculture, forestry and other land use (AFOLU) sector.

The QA/QC and Verification tool allows to compare national GHG inventory data for the AFOLU sector reported to the [United Nation Framework Convention on Climate Change](#) (UNFCCC) (*National Data*, in the remainder) with data from the FAOSTAT Emissions database (*FAOSTAT data*, in the remainder).

This tool fully responds to the [2006 IPCC Guidelines for National Greenhouse Gas Inventories](#) which indicate “verification” an integral part of the overall QA/QC process, entailing a comparison with emissions or removal estimates prepared by external bodies. The verification process can therefore help countries improve their national inventories, given that consistency between national data and independent estimates increases the confidence and reliability of the inventory estimates.

The tool is accessible from the *Tools* menu under the *Resources* tab on the Mitigation of Climate Change in Agriculture (MICCA) Programme web site at:

<http://www.fao.org/in-action/micca/resources/tools/ghg/qaqc-verification/en/>

2. Technical Note

The QA/QC and Verification tool performs a comparison between National Data and FAOSTAT data, both at the emissions and activity data level, in order to facilitate the identification of possible inconsistencies. Presently, the tool contains data for the Agriculture sector only.

National data were extracted from the UNFCCC database (<http://unfccc.int/di/FlexibleQueries.do>) that, at the time of writing, contains data submitted by Non-Annex I countries through National Communications (NC)¹ up to March 2012 and data submitted by Annex I countries through Common Reporting Format tables up to April 2014.

FAOSTAT data were extracted from the FAOSTAT Emissions database ([Emissions – Agriculture](#) and [Emissions – Land Use](#)), which covers AFOLU activities and their associated CO₂, CH₄ and N₂O emissions/removals, calculated following 2006 IPCC Guidelines using a Tier 1 methodology. The FAOSTAT Emissions database provides a comprehensive global time series of emission estimates for

¹ National Communications: In accordance with Article 4, paragraph 1 and Article 12, paragraph 1, each Party shall communicate to the Conference of the Parties, through the secretariat, the following elements of information:

- a) A national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, to the extent its capacities permit, using comparable methodologies to be promoted and agreed upon by the Conference of the Parties.
- b) A general description of steps taken or envisaged by the Party to implement the Convention.
- c) Any other information the Party considers relevant to the achievement of the objective of the Convention and suitable for inclusion in its communication, including, if feasible, material relevant for calculations of global emission trends.

nearly 200 countries and annually updated, based mostly on activity data collected by [FAO via questionnaires](#) and the [Global Forest Resources Assessments](#).

National Data on emissions from the Agriculture sector are reported to the UNFCCC according to the source categories indicated by Decision 17/CP. 8, Table 1 in the Annex (on the left hand-side of the table below). FAOSTAT Data categories are based on the same subdivision, but in some cases use a slightly different name for better readability, as indicated on the right hand-side of the table.

Table – Correspondence of the agriculture categories

UNFCCC Decision 17/CP. 8 Annex Table 1	QA/QC and Verification tool
4. Agriculture	Agriculture Total
A. Enteric Fermentation	Enteric Fermentation
B. Manure Management	Manure Management
C. Rice Cultivation	Rice Cultivation
D. Agricultural Soils	Agricultural Soils
E. Prescribed burning of savannas	Burning - Savanna
F. Field burning of agricultural residues	Burning - Crop Residues

Under the *Agriculture Total* tab of the tool, the Manure Management’s emissions are the sum of the methane (CH₄) and nitrous oxide (N₂O) emissions expressed in Gg CO₂eq. Under the *Manure Management* tab, the tool analyzes in detail only the methane emissions.

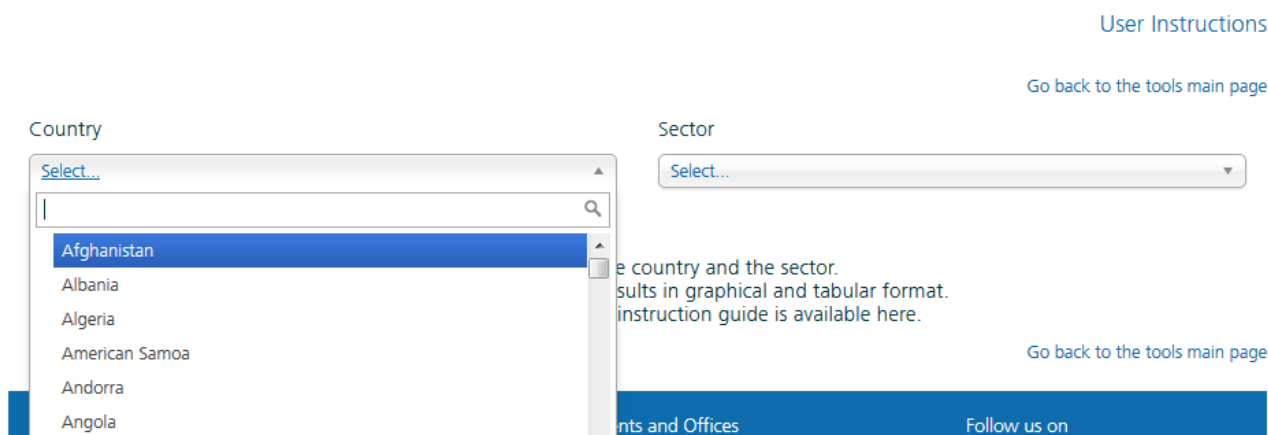
Under the *Agricultural Soils* tab the following sub-categories have been analyzed, but only for the emissions:

- Direct Soil Emissions
 - *Synthetic Fertilizers*
 - *Animal manure applied to soils*
 - *N-fixing Crops*
 - *Crop Residues*
 - *Cultivation of Organic Soils*
 - *Other Direct Emissions*
- Pasture, range and paddock manure
- Indirect Emissions
- Other

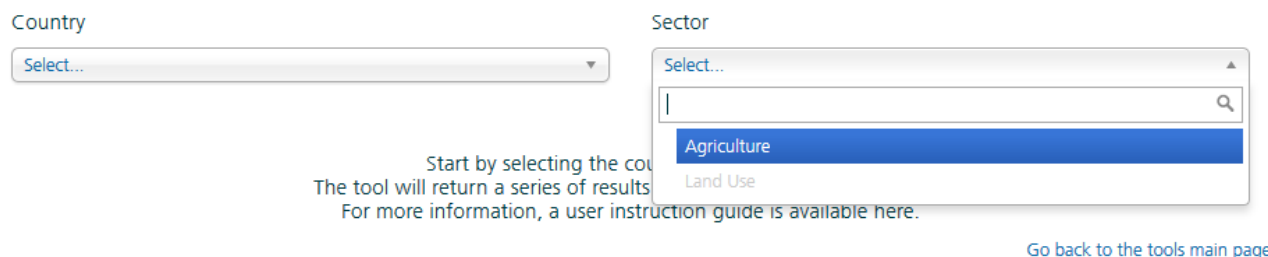
3. User instructions

The first step for using the tool is to click on the “**Country**” drop-down menu and select a country or type in the name of the country you are interested in. Multiple choice is not possible.

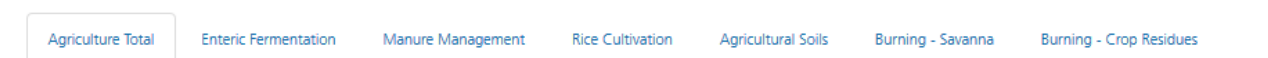
QA-QC and Verification



Secondly, from the “**Sector**” drop-down menu on the right, you can choose to analyze the data for *Agriculture* or *Land Use* (the latter will be made available in the near future).



For the *Agriculture* sector, the following category tabs will appear:



By default, the *Agriculture Total* tab and the *Charts* sub-tab are activated.

A chart is automatically displayed with *Agriculture Total* emissions (in Gg CO₂eq) as retrieved from the FAOSTAT Emissions database and National Data, followed by charts of emissions from all the related agriculture subcategories. The following is an example of that.

When no data is available in either sources (National Data or FAOSTAT Emissions database), the corresponding dataset is not displayed. If none of the two is available, the “Data Not Available” warning is displayed.

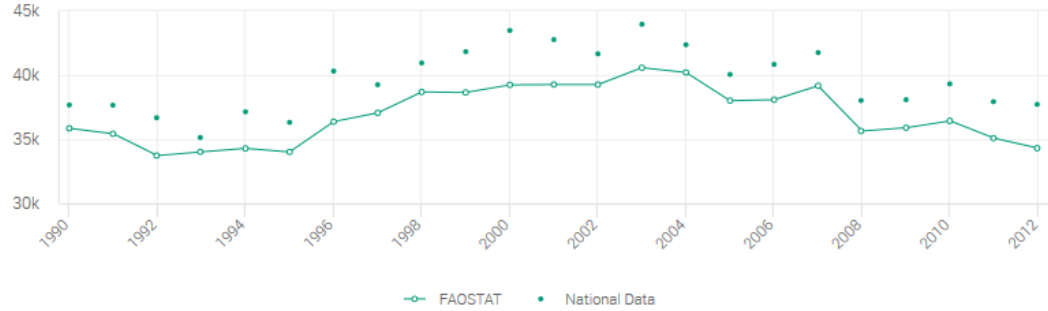
Charts

Tables

Item

Emissions (Gg CO₂eq)

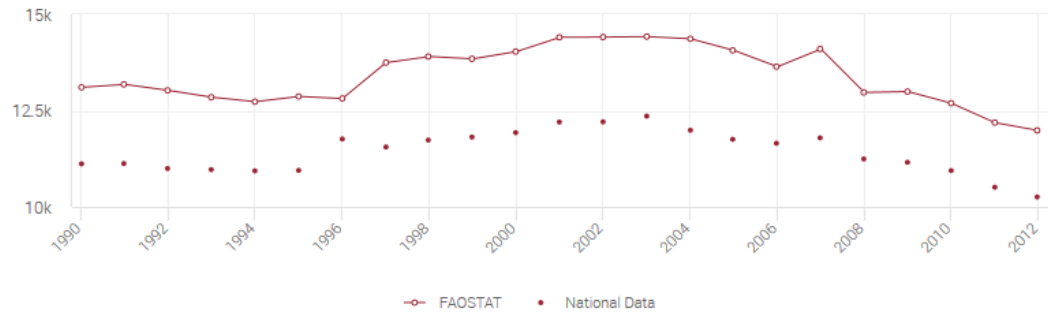
Agriculture Total



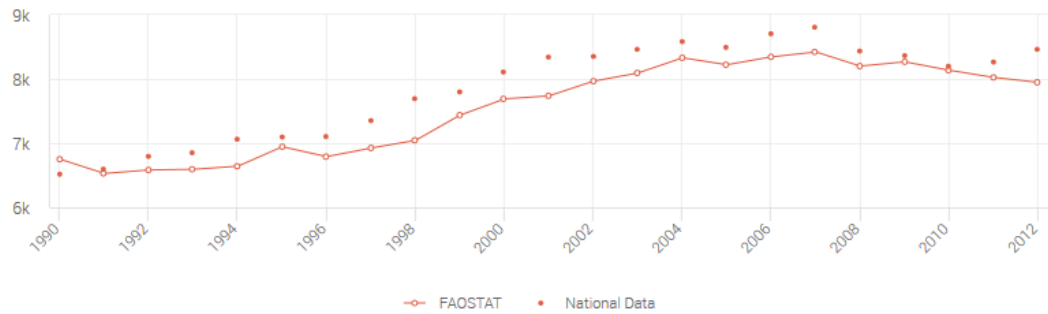
Item

Emissions (Gg CO₂eq)

Enteric Fermentation



Manure Management



These charts are interactive:

- Place the cursor anywhere in the chart area to obtain the corresponding yearly data (from National Data, if available, and/or from the FAOSTAT Emissions database). An example is given:

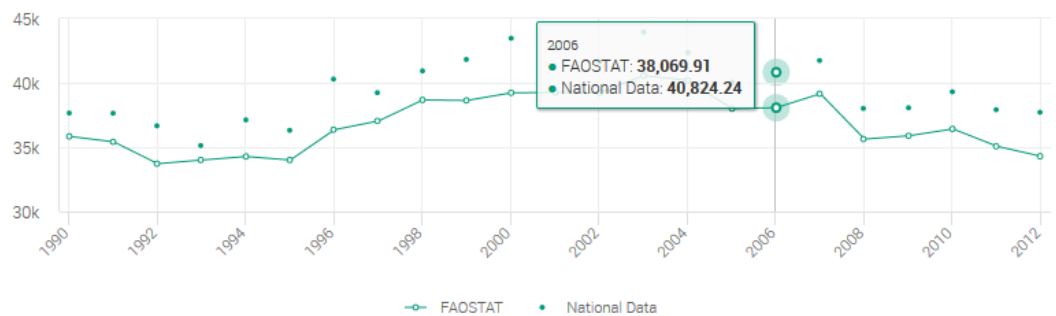
Charts

Tables

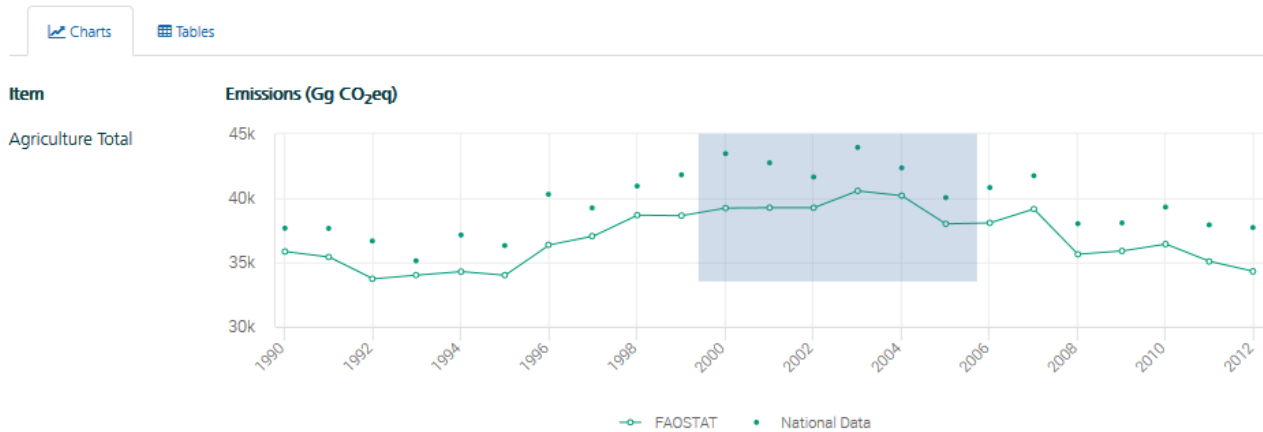
Item

Emissions (Gg CO₂eq)

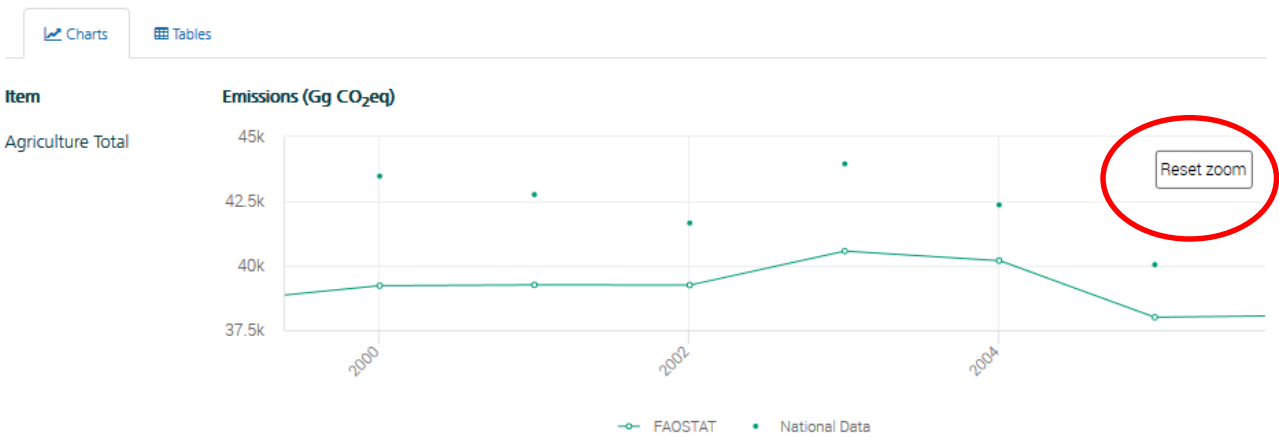
Agriculture Total



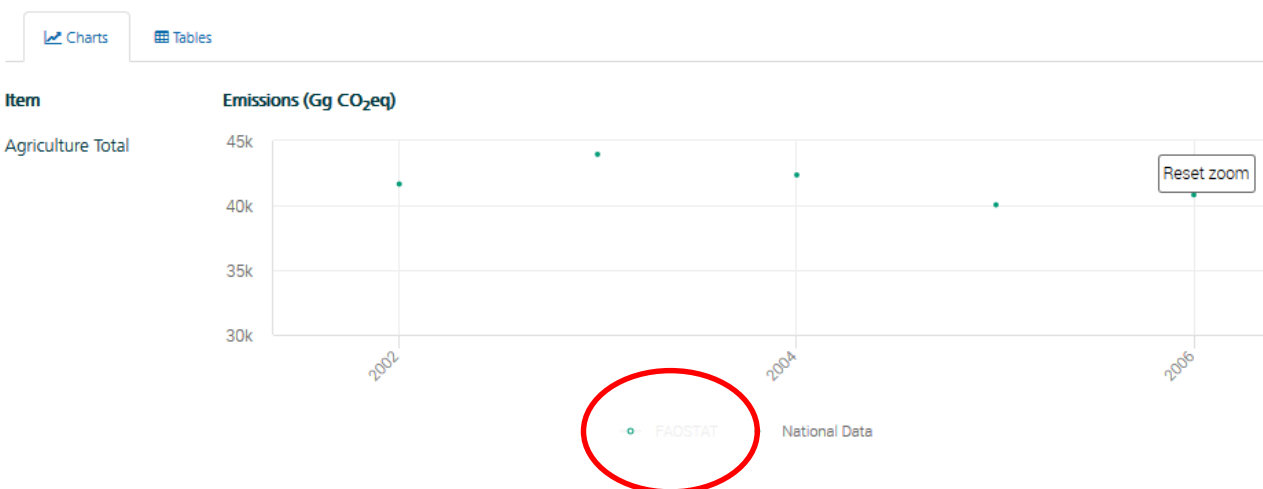
- Drag and drop a window anywhere in any chart area to zoom in on a fewer number of yearly data.



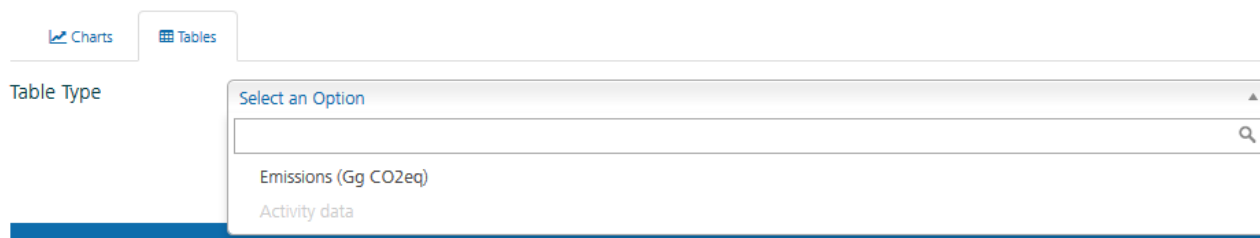
- A reset button will appear to the right of the chart to reverse this operation back to the initial zooming.



- Click on one of the displayed dataset names at the bottom of the chart (i.e. FAOSTAT, National Data) to hide the corresponding data time series. Click it again to have it back.



Data can also be served in tabular format by clicking on the *Tables* tab and selecting the *Emissions (Gg CO2eq)* domain in the *Table Type* selector (Activity Data is not available for Agriculture Total).



As a result, the tool returns the following four tables, in order of appearance:

- Emission estimates from the FAOSTAT Emissions database;
- Emission data as reported by the selected country to the UNFCCC;
- The (percentage) difference in emissions between National Data and FAOSTAT, calculated as: $(National\ Data - FAOSTAT)/FAOSTAT$;
- The weighted difference in emissions between National Data and FAOSTAT, calculated as: $(National\ Data - FAOSTAT)/FAOSTAT\ total\ category$ (where total category, here, is Agriculture Total).

The weighted difference helps in understanding the variation between the National Data and the data reported by FAOSTAT, as well as the proportion of emissions from a category compared with its contribution to the total. The difference is normalized to account for the proportional contribution to the overall/category specific emissions in the country.

In the latter two tables, figures coloured in **green** represent National Data *higher* than the FAOSTAT estimate, while those in **red** represent cases where National Data is *lower* than the FAOSTAT estimate, as illustrated below.

When no data for any given category is available in either sources (National Data or FAOSTAT Emissions database), the corresponding table records, as well as the records in the tables containing differences, are left empty.

A scroll bar is available at the bottom of each table to browse through the available year-data. All scroll bars are synchronized.

An “Export Data” button is available at the top right to download the displayed data in Comma Separated Value format (.csv).

At the beginning and at the bottom of any page, a hyperlink “Go back to the tools main page” allows to return to the landing page of the AFOLU Emissions Analysis tools.

Difference ((National Data – FAOSTAT)/ FAOSTAT) [%]

[Export Data](#)

Category	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
Enteric Fermentation	-14.25	-13.75	-13.79	-14.12	-13.32	-16.36	-14.58	-16.41	-16.53	-14.32	-15.27
Manure Management	7.52	-0.89	-3.02	-1.67	-0.48	1.99	1.87	0.25	0.22	2.13	2.32
Rice Cultivation	-74.42	-76.25	-76.19	-76.21	-76.35	-76.18	-76.19	-76.19	-76.19	-76.05	-76.19
Agricultural Soils	38.26	34.20	34.52	32.54	30.64	31.02	31.41	32.21	29.68	32.40	30.11
Prescribed burning of savannas											
Field burning of agricultural residues	471.84	435.72	440.87	432.93	310.93	387.68	361.95	202.63	300.36	395.96	209.52
Agriculture total	7.60	5.24	5.08	3.19	3.77	3.84	4.44	2.64	2.76	5.70	3.49

Weighted Difference ((National Data – FAOSTAT)/ FAOSTAT total category) [%]

[Export Data](#)

Category	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
Enteric Fermentation	-12.98	-12.28	-12.16	-13.68	-12.76	-14.78	-13.22	-15.93	-14.65	-12.27	-14.01	-13.8
Manure Management	3.69	-0.44	-1.42	-0.85	-0.24	0.89	0.86	0.12	0.10	0.84	0.97	2.01
Rice Cultivation	-6.81	-7.24	-6.85	-7.18	-5.74	-5.25	-5.71	-6.63	-6.10	-5.62	-5.82	-5.85
Agricultural Soils	38.26	34.20	34.52	32.54	30.64	31.02	31.41	32.21	29.68	32.40	30.11	34.5
Prescribed burning of savannas												
Field burning of agricultural residues	3.26	3.09	2.79	2.84	2.24	2.22	2.21	1.52	2.06	2.59	1.56	2.28
Agriculture total	20.27	13.85	13.19	8.76	10.19	9.90	11.53	7.11	7.01	14.08	8.95	15.8

[Go back to the tools main page](#)

Selecting the *Enteric Fermentation* tab results in a new chart being displayed underneath that depicts the full time series of total emissions (sum of emissions from enteric fermentation from all animals).

[Agriculture Total](#)
[Enteric Fermentation](#)
[Manure Management](#)
[Rice Cultivation](#)
[Agricultural Soils](#)
[Burning - Savanna](#)
[Burning - Crop Residues](#)

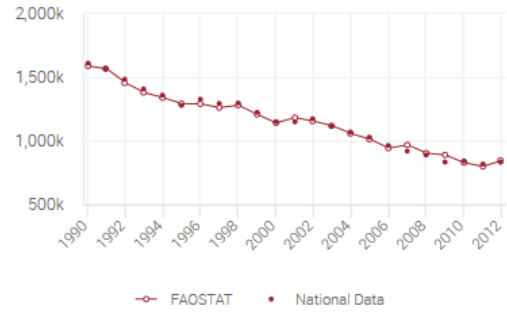
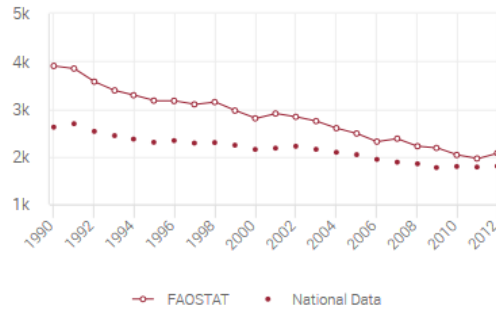
Further down, more charts are shown, which contain a breakdown of data by animal type, with Emissions (Gg CO_{2eq}) on the left and Activity Data (here, Stocks (Head)) on the right. Therefore, it is also possible to compare National Data with FAOSTAT data by animal type, if available for the selected country.

Item

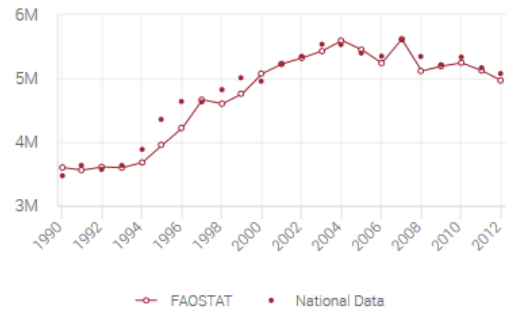
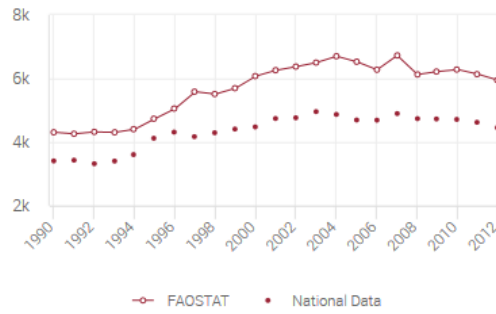
Emissions (Gg CO₂eq)

Stocks [Head]

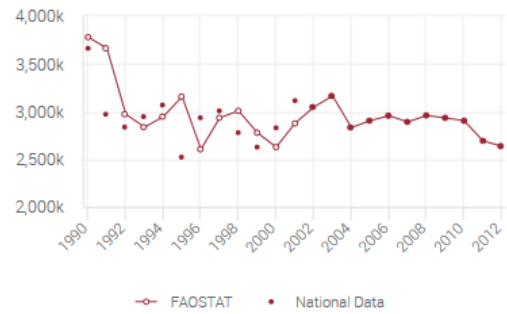
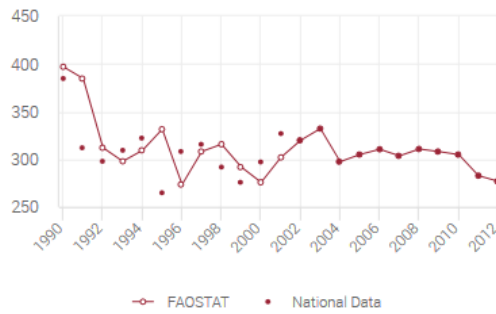
Cattle, dairy



Cattle, non-dairy



Goats



Under the *Tables* tab, selecting Activity Data results in the display of Stocks (Head) from FAOSTAT and National Data, along with the difference between the two. The weighted difference table is not available for Activity Data.

For other agricultural subcategories (Manure Management, Rice cultivation, etc.), the layout and functionalities under the *Charts* and *Tables* tabs are similar to those described above.

