

# Completing the Cool Farm Tool

FAO Climate Smart Agriculture Workshop.  
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# CFT structure and system requirements

- Excel based, compatible with all versions of excel.
- Most questions require an input selection through a drop down menu of options.
- Some questions require numerical data inputs (e.g. fertiliser applications).
- Transparency – all data used in calculations is included in the spreadsheet. Please don't change calculation data, however it is there if you wish to see how calculations are performed.

# 8 Structure

- 1. Site data:** *Location, climate zone, etc*
- 2. Crop management:** *Soil characteristics, inputs, etc*
- 3. Sequestration:** *LUC, tillage, organic inputs, trees, etc*
- 4. Livestock management:** *Feed, manure management, etc*
- 5. Field energy Use:** *Machinery, irrigation, etc*
- 6. Primary processing:** *Washing, storing, grading, etc*
- 7. Transport:** *Inputs to farm, produce from farm*
- 8. Results.** *Tables, figures, graphs, etc*

# Completing the CFT

- It is currently a product specific tool E.g. if doing assessment for maize unless it is an integrated part of the maize production.
- Information is for ***one year period.***
- Livestock tab should only be completed if the assessment is for livestock products (dairy or meat).

# Preparation: ahead of completing the tool

- Energy records
- Fertiliser management/application plan
- Soil data
- Livestock feed composition information

# Walk Through: *home screen*

- Tool overview
- Data entry guidance
- Editing the tool – please avoid where possible and seek support if this is required.

Copy\_of\_TheCoolFarmTool\_v2.0\_beta1 (3) [Compatibility Mode] - Microsoft Excel

Layout Formulas Data Review View Developer

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**The Cool Farm Tool**  
Version 2.0 - beta 1

By location: #VALUE!  
By production: #VALUE!

kg CO2 eq. Per hectare  
kg CO2 eq. Per tonne

HOME GENERAL CROPS SEQUESTRATION LIVESTOCK ENERGY USE PROCESSING TRANSPORT RESULTS

on this page: 1. Licence 2. Disclaimer 3. General Use 4. Credits

Contents of this Calculator

- 1. General Information:** Location, Climate, Farm Size
- 2. Crop Management:** agricultural operations, crop protection, fertiliser use, etc
- 3. Sequestration:** changes to longer term carbon stocks in the system
- 4. Livestock:** feed mix, enteric fermentation, N excretion, manure management
- 5. Field energy use:** irrigation, farm machinery, etc
- 6. Primary processing:** factory storage, etc
- 7. Transport:** by road, rail, ship, or air, of produce from the farm
- 8. Results and Graphs:** detailed summary of results from your input.
- 9. Default Factors:** This page includes editable default values.

Legend

Average Annual Temperature	xyz	A light orange cell color indicates a place for you to input a value.
Average Annual Temperature*	xyz	An asterisk (*) and/or a dark orange input cell indicates a mandatory input value
Average annual temperature	xyz	Areas enclosed by a dashed green box indicate that explanatory information is available for this entry. Click on these boxes to access this information.

Data entry and editing

You may complete whichever sections you have data for, bearing in mind that some of the analyses are only available when the relevant input sections are completed.

Some worksheets are locked by default to prevent users from accidentally overwriting calculations - the password to unlock them is "StayCool"

0.Usage, Licence, Disclaimer 1.GeneralInfo 2.CropManagement 3.Sequestration 4.Livestock 5.FieldEnergyUse 6.PrimaryProcessing 7.Transport 8.Results

# Walk Through: *General info*

- Key information

- Location
- Year (current year)
- Yield
- Production area (size)
- Climate (temperate or tropical)

- Default units – please select as appropriate.

Default Unit system\* Metric

[Select]

Metric

U.S.

**General Info** YOUR RESULTS SO FAR

#VALUE! #VALUE! kg CO2 eq. Per hectare  
kg CO2 eq. Per tonne

HOME on this page
GENERAL 1. Location
CROPS 2. Area
SEQUESTRATION 3. Climate
LIVESTOCK
ENERGY USE
PROCESSING
TRANSPORT
RESULTS

Location	<div style="display: flex; justify-content: space-between;"> <div> <p>Location</p> <p>Year</p> <p>Country/U.S. State*</p> <p>Default Unit system*</p> </div> <div style="border: 1px solid #ccc; padding: 2px;"> <p>[Select]</p> <p>[Select]</p> </div> </div>	<p>Remember: Calls outlined in green will pop-up with more information if you click on</p>								
Area	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Product</th> <th style="width: 40%;">Unit</th> </tr> </thead> <tbody> <tr> <td>Production Area*</td> <td>hectares</td> </tr> <tr> <td>Fresh product from production area*</td> <td>tonnes</td> </tr> <tr> <td>Finished product from total area*</td> <td>tonnes</td> </tr> </tbody> </table>	Product	Unit	Production Area*	hectares	Fresh product from production area*	tonnes	Finished product from total area*	tonnes	
Product	Unit									
Production Area*	hectares									
Fresh product from production area*	tonnes									
Finished product from total area*	tonnes									
Climate	<div style="display: flex; justify-content: space-between;"> <div> <p>Climate*</p> <p>Average annual temperature (if known)</p> </div> <div style="border: 1px solid #ccc; padding: 2px;"> <p>[Select]</p> <p>Select Climate or enter ave temp</p> </div> <div style="width: 10%;"> <p>Unit</p> <p>°C</p> </div> </div>									

**Optional - for co-product**

	Name	1. Economic value - relative to main product (%)
Co-product 1		
Co-product 2		
Co-product 3		
Co-product 4		

OR

**Questions so far**





# Walk Through: *crop management*

- Key information on the farm conditions
  - Crop type (drop-down list). If rice is selected, additional information is required.
  - What is your soil texture? (Sand, silt, loam, clay, coarse, medium, fine).
  - Soil organic matter content?
  - Are soils moist/dry during the growing period (do you irrigate?)
  - Soil drainage (good/poor)
  - Soil pH (selected ranges)

## Rice specific

days under cultivation  
water management before cultivation  
water management during cultivation

These cells only appear for input if you select rice as the crop. Ignore otherwise

Crop type\*

Winter wheat

Winter wheat  
Other grain  
Other legume  
Other N-fixing forage  
Other Non-N-fixing forage  
Other root crops  
Other tuber crop  
Other

**Crop Management**

YOUR RESULTS SO FAR

By land area: #VALUE!  
By production: #VALUE!

kg CO2 eq. / ha / hectare  
kg CO2 eq. / tonne

HOME GENERAL CROPS SEQUESTRATION LIVESTOCK ENERGY USE PROCESSING TRANSPORT RESULTS

on this page: 1. Production 2. Soil 3. Fertiliser Use 4. Pesticide Applications 5. Crop Residue Management 6. Crop Management Results

Crop type

Crop type\* [Select]

Soil

Soil texture\* [Select]  
Soil Organic Matter\* [Select or enter exact amount]  
Soil moisture\* [Select]  
Soil drainage\* [Select]  
Soil pH\* [Select]

# Walk Through: *crop management*

## • Fertilisers

- Types – drop down list
- Nutrient or product (Active ingredient)
- Application rates and method employed
- Specify whether units are in active ingredient or as total product applied.  
E.g. Ammonium Nitrate – 32%, 72kg/acre.
- Fertiliser production technology (if unknown, select current tech)

**Fertiliser Use**

For the soil carbon effect of organic amendments to be estimated you must also complete the relevant section of the sequestration tab.

	Fertiliser	Nutrient or product	Application rate	Unit (e.g. tonnes, kgs, pounds)	Application method	Emissions inhibitors	Fertiliser production
Fertiliser 1	Urea ammonium nitrate solution - 32% N	N	5120	fluid ounces/acre	Subsurface drip	None	New tech
Fertiliser 2	Calcium nitrate - 15% N	N	2560	fluid ounces/acre	Subsurface drip	None	New tech
Fertiliser 3	Compound NPK 15%N 15% K2O 15% P2O5	P	3840	fluid ounces/acre	Incorporate	None	New tech
Fertiliser 4	[Select]	0	0	pounds/acre (US)	0	None	Current tech
Fertiliser 5	[Select]	0	0	pounds/acre (US)	0	None	Current tech
Fertiliser 6	[Select]	0	0	pounds/acre (US)	0	None	Current tech

Fertiliser 1: Urea ammonium nitrate solution - 32% N

Fertiliser 2: Compost (zero emissions) - 1% N  
Compost (fully aerated production) - 1  
Compost (non-fully aerated production)

Fertiliser 3: Cattle Farmyard manure - 0.6% N  
Pig Farmyard manure - 0.7% N  
Sheep Farmyard manure - 0.7% N  
Horse Farmyard Manure - 0.7% N

Fertiliser 4: [Select]

Fertiliser 5: [Select]

Fertiliser 6: [Select]

Unit (e.g. tonnes, kgs, pounds)

Application method

Emissions inhibitors

Fertiliser production

# Walk Through: *crop management*

- Pesticides
  - Number of applications
- Crop residues
  - What do you do with them?
    - Leave on field
    - Burn
    - Collect for other use
- Rice crops
  - Straw incorporation

**Crop Management**

on the page: 1. Production 2. Soil 3. Fertiliser Use 4. Pesticide Applications 5. Crop Residue Management 6. Crop Management Results

**Pesticide applications**

Number of applications:

**Crop residue management (if this section is not completed then the worst case - "Removed, left untreated, " is assumed)**

Amount of residue:  Unit:  Rice only:

Method:

Estimated emissions	kgs CO2	kgs N2O	kgs CH4	kg CO2 eq
Fertiliser production	#VALUE!			#VALUE!
Background (direct and indirect N2O)		-		-
Fertiliser induced field emissions	#VALUE!	-		#VALUE!
Methane from Paddy Rice			-	-

0. Usage, Licence, Disclaimer 1. General Info 2. Crop Management 3. Sequestration 4. Livestock 5. Field Energy Use 6. Primary Processing 7. Transport 8. Results

# Walk Through: *sequestration*

- Enables the user to demonstrate where they are reducing their carbon footprint and storing carbon.
- **Land use change (LUC)** (i.e. expansion of farm land and the conversion of land into agricultural land) is an important for GHG emissions. It can either release emissions or sequester them.

- Have LUC changes occurred?
- How many years ago (important to include if it was within 20 years or less).
- What percentage of field/farm was converted?
- Conversion type.

# Walk Through: *sequestration*

- **Management changes** on the productive areas of land relevant to assessment crop.
  - Tillage
  - Cover cropping
  - Compost
  - Manure
  - Crop residue

Tillage Changes

Conventional to Reduced

Manure additions

started incorporating

## Sequestration

YOUR RESULTS SO FAR

by land area: #VALUE!
kg CO2 eq Per hectare

by production: #VALUE!
kg CO2 eq Per tonne

HOME
GENERAL
CROPS
SEQUESTRATION
LIVESTOCK
ENERGY USE
PROCESSING
TRANSPORT
RESULTS

on this page: 1. Land Use Changes   2. Management Changes   3. Tree Cropping   4. Sequestration

		How long ago was this change made? (years)	Percentage of land with practice change		
Management changes	Tillage Changes	Conventional to Reduced	2	100	%
	Cover cropping	no change	0	0	%
	Compost	no change	0	0	%
	Manure additions	started incorporating	6	0	%
	Residue incorporation	stopped incorporating	0	0	%

# Walk Through: *sequestration*

- **Trees and bushes** are important storages for carbon on a farm, as well as being great for biodiversity!
- Here, you can show where carbon is stored on your farm.
- Difficult to include all tree species (and data doesn't exist) so we have to make some assumptions occasionally.  
e.g. fruit trees are best represented by the option for 'temperate hardwood'.

**Sequestration** YOUR RESULTS SO FAR to view more to understand #VALUE! #VALUE! kg CO2 eq. Per hectare kg CO2 eq. Per tonne

HOME GENERAL CROPS SEQUESTRATION LIVESTOCK ENERGY USE PROCESSING TRANSPORT RESULTS

on this page 1. Land Use Changes 2. Management Changes 3. Tree Cropping 4. Sequestration

Annual biomass for trees in cropping system

Species	density (trees per hectare) last year	unseasoned at breast height	this year	last year	units	change in number of trees this year
Tree/bush species 1 <input type="text" value="hardwood"/>	0		0	0	cm	0
Tree/bush species 2 <input type="text" value="select"/>	0		0	0	cm	0
Tree/bush species 3 <input type="text" value="select"/>	0		0	0	cm	0
Tree/bush species 4 <input type="text" value="select"/>	0		0	0	cm	0
Tree/bush species 5 <input type="text" value="select"/>	0		0	0	cm	0
Tree/bush species 6 <input type="text" value="select"/>	0		0	0	cm	0
Tree/bush species 7 <input type="text" value="select"/>	0		0	0	cm	0
Tree/bush species 8 <input type="text" value="select"/>	0		0	0	cm	0
Tree/bush species 9 <input type="text" value="select"/>	0		0	0	cm	0
Tree/bush species 10 <input type="text" value="select"/>	0		0	0	cm	0

Annual totals	kg CO2 eq.	Cumulative totals	kg CO2 eq.
Above ground biomass		Above ground biomass	
Below ground biomass		Below ground biomass	
Soil C		Soil C since practice changes	

accumulated or lost from the system since the changes in the above boxes. This may be due to the land use change, tillage practice change, practice change or the beginning of the plantation

1. General Info 2. Crop Management 3. Sequestration 4. Livestock 5. Fertiliser/energy use 6. Processing 7. Transport 8. Results Graph

Questions this far



# Walk Through: *Livestock*

- Complete the livestock tab **only** if you are completing the tool for meat, dairy, or other animal products.
- Complete one Cool Farm Tool for each animal type.
- Life-cycle or snap-shot approach
  - Snapshot: emissions of present livestock (one year)
  - Life-cycle: total emissions over lifespan of livestock
- More detail on each approach to feature to follow.

**Livestock**

YOUR RESULTS SO FAR  
by land area by production #VALUE! #VALUE!  
kg CO2-eq. Per hectare kg CO2-eq. Per tonne

HOME GENERAL CROPS SEQUESTRATION **LIVESTOCK** ENERGY USE PROCESSING TRANSPORT RESULTS

on this page: 1. Life cycle 2. Juvenile 3. Adult Productive 4. Adult Non-productive 5. Animal Residue 6. Results

**Life cycle**

This section should always be completed if using this tab  
The data to the right may either represent a typical life cycle or else a snapshot

Life cycle or snapshot: Snapshot

Livestock type\*: pigs

	Length of phase	Time unit
Juvenile phase	0	Weeks
Adult productive phase*	13	Weeks
Adult non-productive phases	0	0

Number of animals	0
Number of animals*	200
Number of animals	0



# Walk Through: *Livestock*

- Important emissions from livestock include:

## 1. Feed

- Animals have different feed requirements at different life phases (amount and composition)
- If feed is a combination of grazing and feed mix, enter the approximate percentages.
- Enter the type of grazing animals have access to (high, med, low)
- Grazing access (open, pasture)
- Can specify own feed mix.

**OPTIONAL INPUTS**

dry matter intake per head  g/day

dry matter intake can be estimated from the following

Feed Component	Percentage
1. Select	0 %
2. Select	0 %
3. Select	0 %
4. Select	0 %
5. Select	0 %
6. Select	0 %
7. Select	0 %
8. Select	0 %
9. Select	0 %
10. Select	0 %
Total	0 %

start weight

female adult weight

male adult weight

number of (juvenile) females

Estimated dry matter intake

Unit

**Livestock**

your details go / go

WVALUE! WVALUE!

Ag 2022 AG, 2023 AG, 2024 AG, 2025 AG, 2026 AG, 2027 AG, 2028 AG, 2029 AG, 2030 AG

HOME GENERAL CROPS SEQUESTRATION LIVESTOCK ENERGY USE PROCESSING TRANSPORT RESULTS

on this page: 1. Life cycle 2. Juvenile 3. Adult Productive 4. Adult Non-productive 5. Animal Results 6. Results

**FEED CHARACTERISTICS**

Percentage of diet from feed mix (instead of grazing)

Type of grazing if applicable

Quality

Type

You may select components of your own feed mix to the right to estimate emissions for this component. If you leave this section blank emissions will be assumed for European cereal production.

# Walk Through: *Livestock*

- Important emissions from livestock include:

## 2. Manure Management

- Drop down list of manure management techniques.

manure management are required for simple (Tier 1) estimate. Optional inputs can be used to refine the estimate (Tier 2).

**MANURE MANAGEMENT**

Manure management system	Percentage of manure managed under this system (when in use)	Number of days per year this system is used
[Select]	0	0
[Select]	0	0
[Select]	0	0
Comments on manure management: (Type over this cell to enter any comments about your manure management strategy .)		0

**Manure management system**

[Select]

- Daily spread
- Solid storage
- Dry lot
- Liquid slurry with natural crust cover
- Liquid slurry without natural crust cover
- Uncovered anaerobic lagoon
- Pit storage below animal confinements
- Anaerobic digester

# Walk Through: *Livestock*

- Breakdown of livestock emissions at the bottom of the livestock page.

- Snapshot
  - “annualized emissions in kg per year”
  - For per day emissions divide this by 365

- Life-cycle
  - ‘whole lifecycle’ emissions

**Livestock** YOUR RESULTS SO FAR kg CO2 eq. Per hectare #VALUE! kg CO2 eq. Per tonne

on the page: 1. Life cycle 2. Juvenile 3. Adult Productive 4. Adult Non-productive 5. Animal Residue 6. Results

Annualised emissions in kg per year

	Total in feed	Enteric	Manure CH <sub>4</sub>	Manure direct N <sub>2</sub> O	Manure indirect N <sub>2</sub> O	kg CO <sub>2</sub> eq.
Growing phase	-	-	-	-	-	-
Productive adults	36,060.5	104.7	328.7	66.8	60.1	84,450.9
Non-productive adults	-	-	-	-	-	-
<b>Totals</b>	<b>36,060.5</b>	<b>104.7</b>	<b>328.7</b>	<b>66.8</b>	<b>60.1</b>	<b>84,450.9</b>

Life cycle

						kg CO <sub>2</sub> eq.
	-	-	-	-	-	-
	8,990.4	26.1	81.9	16.6	15.0	21,054.9
	-	-	-	-	-	-
	8,990.4	26.1	81.9	16.6	15.0	21,054.9

1. General Info 2. Crop Management 3. Sequestration 4. Livestock 5. Feed Energy Use 6. Primary Processing 7. Transport 8. Results Graphs

Questions this far



# Walk Through: *Energy*

- Energy is an important part of the farm GHG balance.
  - Include all energy used on farm.
  - Two options for completion:
    - **Option 1:** Total annual energy use (electricity and fuel use)
- OR
- **Option 2:** Operations energy breakdown (see next slide)
- Option is easier and preferable.

**Field Energy Use** YOUR RESULTS TO SO FAR

on this page: 1. Energy Sources 2. Machinery 3. Energy Use Results

**Annual Energy Use**

	Quantity	Units
Electricity use on the farm	0	kWh
Electricity from local hydro renewable energy used in field	0	kWh
Electricity from local wind used in field	0	kWh
Electricity from solar (photovoltaic cells)	0	kWh

	Quantity	Units
Diesel	0	litres
Petrol	0	litres
Biodiesel	0	litres
Bioethanol	0	litres
High density biomass	0	kg
Fuel wood	0	kg
Coal	0	kg
Gas	0	therms
Oil	0	litres
Liquid Propane	0	litres

# Walk Through : *Energy*

- Option 2 for energy input information
- Machinery operations breakdown
- This may be preferable if total energy consumption information is unavailable.

Field Energy Use

YOUR RESULTS SO FAR

kg emissions  
kg production

#VALUE!

#VALUE!

kg CO2 eq. Per hectare

kg CO2 eq. Per tonne

HOME

GENERAL

CROPS

SEQUESTRATION

LIVESTOCK

ENERGY USE

PROCESSING

TRANSPORT

RESULTS

on this page:

1. Energy Sources

2. Machinery

3. Energy Use Results

OPTIONAL: Machinery emissions calculator - use this if required to estimate emissions from machinery use in place of or in addition to the above. This requires crop area [GeneralInfo], harvested product [GeneralInfo], and soil texture [CropManagement] to work

Fuel type	Diesel	
	Number of operations	litres fuel used
Tillage	chisel plough	0
Tillage	coulters	0
Tillage	disc gang	0
Tillage	disc harrow	1
Tillage	disc bedder	0
Tillage	field cultivator/ridger	0
Tillage	grain drill	0
Tillage	grain drill-no-till	0
Tillage	hoe drill	0
Tillage	land plane/bedstener	0
Tillage	moldboard plough	0
Tillage	pneumatic disk	1
Tillage	rod weeder	0
Tillage	roller harrow	1
Tillage	roller packer	0
Tillage	rotary hoe/bed tiler	0
Tillage	row crop cultivator	0
Tillage	row crop planter	0
Tillage	subsoiler	0
Tillage	sweep plough	0
Tillage	tine harrow/seed handling transport	0
Tillage	tooth harrow	0

# Walk Through: *Energy*

- Not ALL potential machinery operations are presented in the tool – if yours doesn't feature, please select one that may be representative and list this in the assumptions box at the end.

Field Energy Use

YOUR RESULTS SO FAR

kg diesel/ha

kg production

#VALUE!

#VALUE!

kg CO2/kg. Per hectare

kg CO2/kg. Per tonne

HOME

GENERAL

CROPS

SEQUESTRATION

LIVESTOCK

ENERGY USE

PROCESSING

TRANSPORT

RESULTS

on this page: 1. Energy Sources 2. Machinery 3. Energy Use Results

Tillage	tine harrow/seed handling transport	0	0
Tillage	tooth harrow	0	0
Spraying/ spreading	herbicide spraying	0	1344
Spraying/ spreading	fertiliser spraying	4	480
Spraying/ spreading	fertiliser spreading	0	0
Harvesting	Baler	0	0
Harvesting	Beet harvester	0	0
Harvesting	combine	1	10758 48343
Harvesting	corn combine	0	0
Harvesting	cotton picker	0	0
Harvesting	cotton stripper/potato topper	0	0
Harvesting	forage blower/washer	0	0
Harvesting	forage harvester	0	0
Harvesting	manure spreader	0	0
Harvesting	mower/grader	0	0
Harvesting	mower-conditioner	0	0
Harvesting	potato harvester	0	0
Harvesting	potato windrower	0	0
Harvesting	rake	0	0
Harvesting	tomato harvester	0	0
Harvesting	windrower/seather	0	0
Total		13,894.36	

23

# Walk Through: *Energy allocation*

- The CFT should include the energy used to grow the crop under assessment only.
- This may require the allocation of total energy used to be divided between different crops based on the yield.



# Walk Through: *primary processing*

- Maybe not required if field energy use is employed

**Primary Processing**

YOUR RESULTS SOLAR

Agroforestry Agroforestry #VALUE! #VALUE! kg CO2eq. Performance kg CO2eq. Performance

Home GENERAL CROPS SEQUESTRATION LIVESTOCK ENERGY USE PROCESSING TRANSPORT RESULTS

on this page Energy 2. Waste Water 3. Primary Processing/Results

	Quantity	Units
Electricity from grid or local renewables	Electricity used from National or Local Grid	0 kWh
	Electricity from local hydro renewable energy used in factory	0 kWh
	Electricity from local wind used in factory	0 kWh
	Electricity from solar (photovoltaic cells)	0 kWh
Energy from burning biomass and fossil fuels in factory	Diesel Use, e.g. generators, pumping	0 litres
	High density biomass	0 kg
	Fuel wood	0 kg
	Coal	0 kg
	Gas	0 therms
	Oil	0 litres
	Liquid propane	0 litres
	Other (user defined energy density/therms/litre)	0 [Select]
Waste water containing	Quantity of waste water produced annually	0 litres

1. General Info 2. Crop Management 3. Sequestration 4. Livestock 5. Field Energy Use 6. Primary Processing 7. Transport 8. Results/Graphs

Biochemical (BOC) or chemical (COO) oxygen demand

# Walk Through: *Transport*

- Maybe not required – intended for supply chain analyses rather than farm based

**Transport**

your results so far

#VALUE! #VALUE!

kg CO2 eq. The baseline kg CO2 eq. The baseline

on this page: 1. Road 2. Rail 3. Air 4. Ship 5. Results

**Road**

quantity	unit	distance	unit	mode	add vehicle weight?
1	tonnes	0	km	Heavy Goods Vehicle	yes - returning empty
2	tonnes	0	km		yes - returning empty
3	tonnes	0	km		yes - returning empty
4	tonnes	0	km		yes - returning empty
5	tonnes	0	km		yes - returning empty
6	tonnes	0	km		yes - returning empty
7	tonnes	0	km		yes - returning empty
8	tonnes	0	km		yes - returning empty

**Assumptions:** This transport includes: (Type over this message to enter which materials you have included in this section.)

**Rail**

quantity	unit	distance	unit
1	tonnes	0	km
2	tonnes	0	km
3	tonnes	0	km
4	tonnes	0	km
5	tonnes	0	km
6	tonnes	0	km
7	tonnes	0	km
8	tonnes	0	km

**Assumptions:** This transport includes: (Type over this message to enter which materials you have included in this section.)

**Air**

quantity	unit	distance	unit	type
1	tonnes	0	km	Very Short Haul
2	tonnes	0	km	Very Short Haul
3	tonnes	0	km	Very Short Haul
4	tonnes	0	km	Very Short Haul
5	tonnes	0	km	Very Short Haul
6	tonnes	0	km	Very Short Haul
7	tonnes	0	km	Very Short Haul
8	tonnes	0	km	Very Short Haul

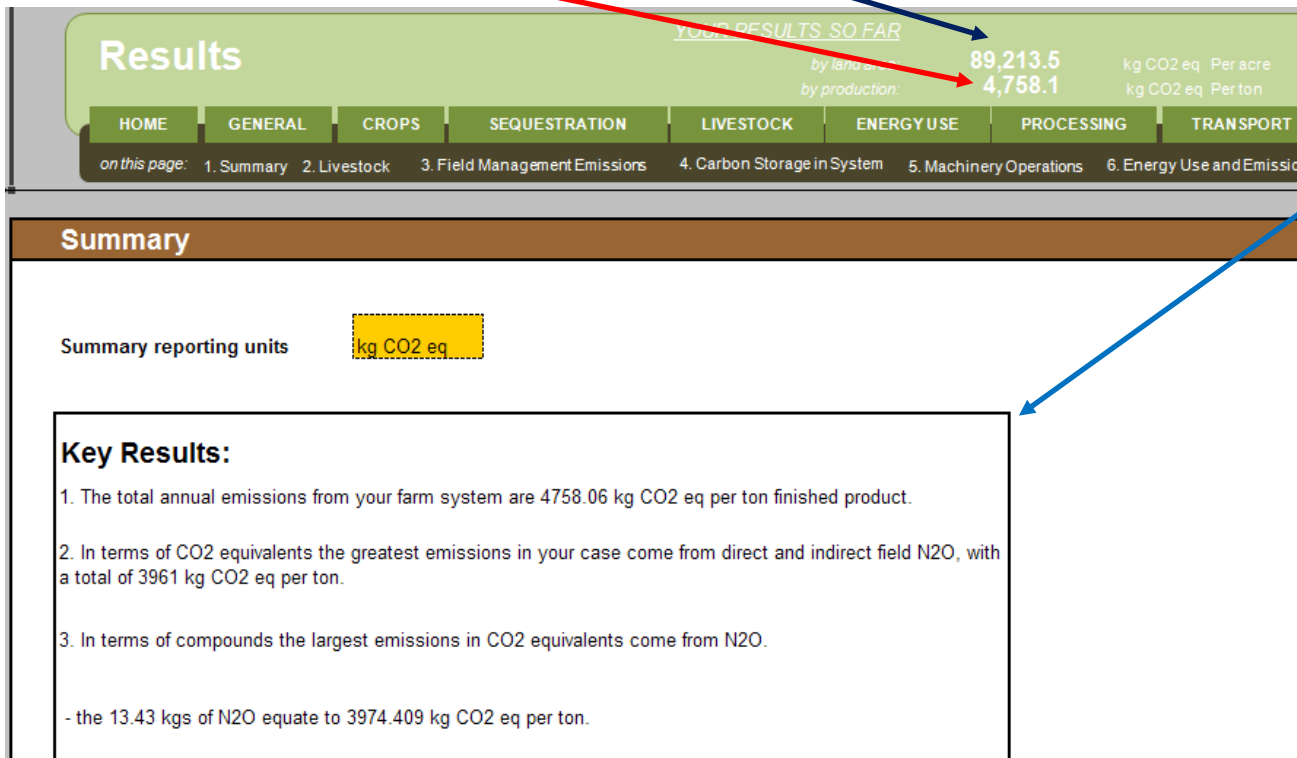
**Assumptions:** This transport includes: (Type over this message to enter which materials you have included in this section.)

**Very Short Haul:** < 500 miles or 800 kms  
**Short Haul:** Between 500 miles (800 kms) and 1000 miles (1600 kms)  
**Long Haul:** > 1000 miles or 1600 kms

1. General Info 2. Crop Management 3. Sequestration 4. Livestock 5. Fertiliser/Manure 6. Primary Processing 7. Transport 8. Results/Graphs

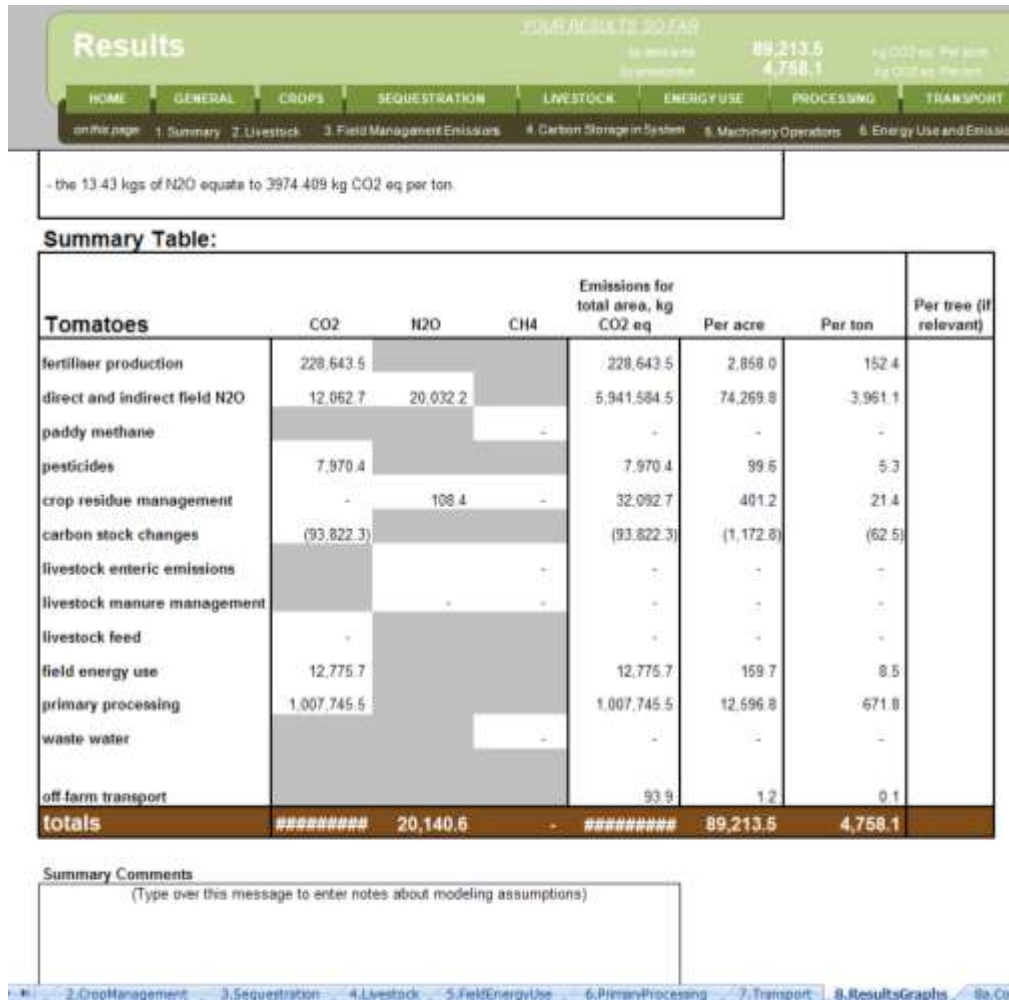
# Walk Through: *Results*

- Well done on getting to the end! We realise there is a lot of information required.
- Results are instant and will be shown in total kg CO2 eq:
  - Per land area
  - Per tonne of crop



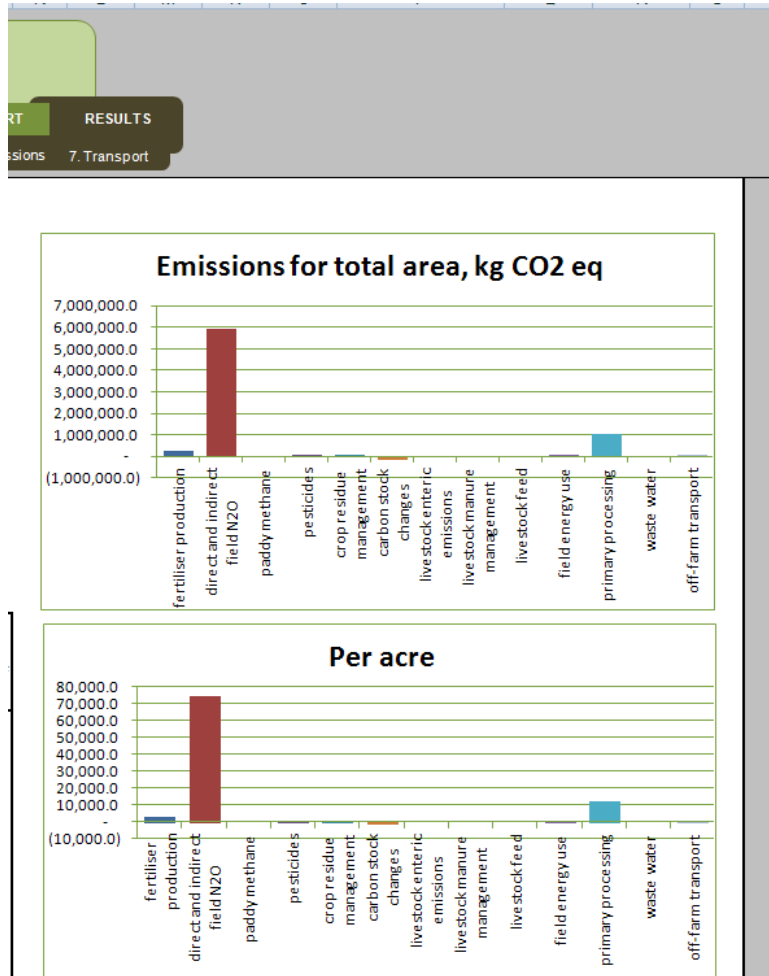
- Key emissions breakdown will be provided

# Walk Through: *Results*



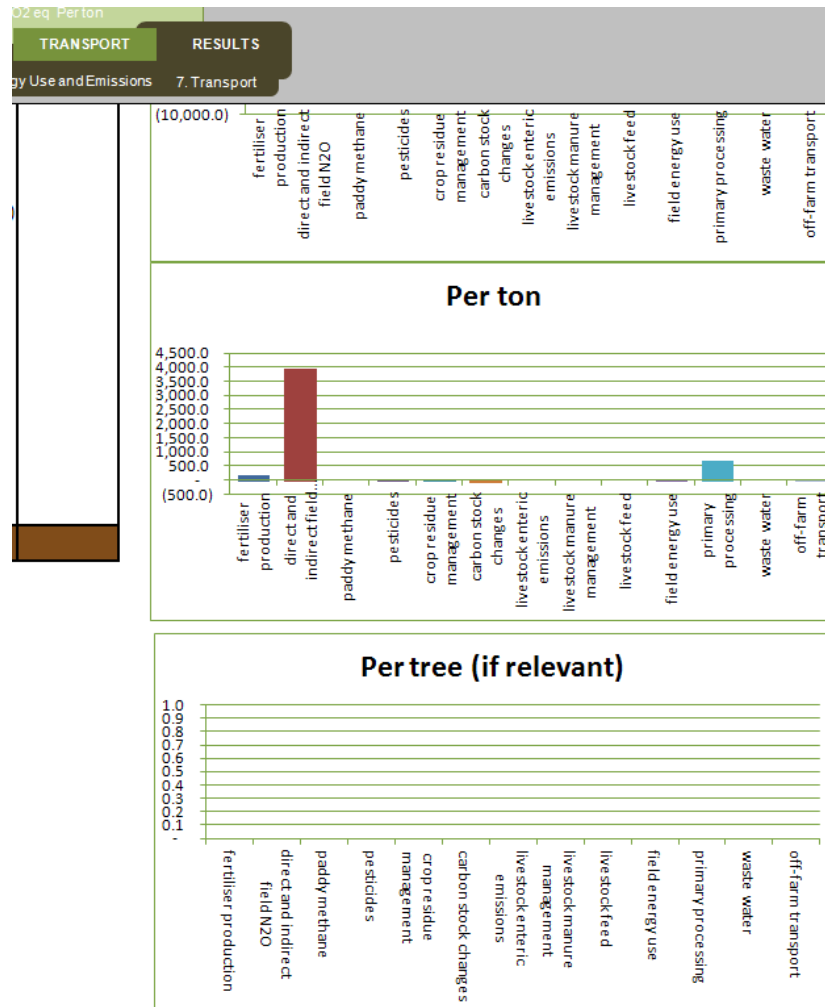
- Summary of emissions per hotspot.
- Enables identification of farm management practices that contribute most to the GHG profile for the farm.
- Assumptions made can be entered here too e.g. where information was limited/unavailable.

# Walk Through: *Results*



- Graphical display of emissions per hotspot.
- Can conduct scenario analysis by changing inputs and looking at the change to results.

# Walk Through: *Results*



- Different graphs available for review and understanding of results.
- The 'per tree' graph shows any GHG sequestration from trees on the farm.

# Questions this far



# Troubleshooting the Cool Farm Tool

Carbon Footprint data collection



# Agenda

- Addressing commonly asked questions:
  - General information
  - Crop management
  - Fertilizers
- Error messages
- Energy: trouble shooting
- Energy: allocation example
- Livestock – life-cycle approach
- Feedback
- Further Guidance

# General info

- *Who for:* **Everyone**
- *Location:* Record keeping and especially useful if several areas of land are managed.
- *Year:* record keeping
- *Country/state:* important to accurately reflect the energy mix in your area.
- *Units:*
  - Metric
  - U.S. units

# General info

- *Production area*: total land area devoted to growing the crop in question.
- *Fresh product*: total annual production from the area farmed for the crop.
- *Finished product*: typically the same as fresh product so enter the same value (may be different for oilseed crops)
- *Units*:
  - Production area – acres or hectares
  - Product – several options

Product	Unit
Production Area*	hectares
Fresh product from production area*	tonnes
Finished product from total area*	tonnes

tonnes

kgs

tons (US, short)

litres

pieces

trees

gallons

pounds

# General info

- *Climate information:* just two options for annual average temperatures.
  - Temperate: 50°F or 10°C
  - Tropical: 64.4°F or 18°C
- Always choose the one closest to your situation – this is important for calculating other emissions.
- And - If you know your own climate's average temperature and it is different from these averages, you can enter the correct average temperature. *Don't forget the units!*

Climate*	[Select]	Unit
Average annual temperature (if known)	Select Climate or enter ave temp	°C

Unit

°C

[Select]

°C

°F

# Crop Management

- *Who for:* Crop producers and feed production for livestock.
- *Crop type:* select from list, if you do not see your exact crop, choose the category at the end of the list that includes your crop.
- *Soil texture:*
  - Fine, medium or coarse
  - Clay, loam, sandy-loam, silt etc.
- *Soil moisture:* irrigated soils should be classed as moist. Important for calculating N2O emissions

**Crop Management** YOUR RESULTS SO FAR

by land area: #  
by production: #

HOME GENERAL CROPS SEQUESTRATION LIVESTOCK ENERGY USE

on this page: 1. Production 2. Soil 3. Fertiliser Use 4. Pesticide Applications 5. Crop Residue Management 6. Crop

**Crop type**

Crop type\* [Select]

[Select]  
Alfalfa  
Apple  
Barley  
Clover  
Coffee  
Cotton  
Dry Bean

dropdown list  
date correctly,  
e closest crop  
you don't see  
he list, select  
he product you

**Soil**

Soil texture\* [Select]  
Soil Organic Matter\* [Select or enter exact amount]  
Soil moisture\* [Select]  
Soil drainage\* [Select]  
Soil pH\* [Select]

# Crop mgmt: *Fertilizers*

- Which fertilizers do you use?

1) If you know the specific application rate of the nutrient itself (N, P, K, Ca etc.) you can select the product you apply AND then select the specific nutrient.

2) If you know only the application rate of the product, select *product* from the drop-down list.

Fertiliser Use								
	Fertiliser	Nutrient or product	Application rate	Unit (e.g. tonnes, kgs, pounds)	Application method	Emissions inhibitors	Fertiliser production	
	Fertiliser 1	[Select]	0	0	[Select]	0	None	Current tech
	Fertiliser 2	[Select]	0	0	[Select]	0	None	Current tech
	Fertiliser 3	[Select]	0	0	[Select]	0	None	Current tech
	Fertiliser 4	[Select]	0	0	[Select]	0	None	Current tech
	Fertiliser 5	[Select]	0	0	[Select]	0	None	Current tech
	Fertiliser 6	[Select]	0	0	[Select]	0	None	Current tech

For the soil carbon effect of organic amendments to be estimated you must also complete the relevant section of the sequestration tab.

# Crop mgmt: *Fertilizers*

- What happens if I get an error message?

	Fertiliser	Nutrient or product	Application rate	Unit (e.g. tonnes, kgs, pounds)	Application method	Emissions inhibitors	Fertiliser production		
Fertiliser 1	Ammonium Bicarbonate - 30% N	MgO	0	[Select]	0	None	Current tech	Error: Please check whether this nutrient is present in the chosen fertiliser	
Fertiliser 2	Ammonium nitrate - 35% N	P	0	[Select]	0	None	Current tech	Error: Please check whether this nutrient is present in the chosen fertiliser	
Fertiliser 3	[Select]	0	0	[Select]	0	None	Current tech		
Fertiliser 4	[Select]	0	0	[Select]	0	None	Current tech		
Fertiliser 5	[Select]	0	0	[Select]	0	None	Current tech		
Fertiliser 6	[Select]	0	0	[Select]	0	None	Current tech		

- Check the nutrient you have entered is present in the fertilizer you have selected.

- Select 'product' from the list if you are unsure.

- Fertilizers to choose from include these:
- More are being added to the list currently.

Ammonium Bicarbonate - 30% N  
 Ammonium nitrate - 35% N  
 Ammonium sulphate - 21% N  
 Anhydrous ammonia - 82% N  
 Calcium ammonium nitrate - 27% N  
 Calcium nitrate - 15% N  
 Compound NK - 19.5% N; 29.5% K  
 Compound NPK 15%N 15% K2O 15% P2O5  
 Diammonium phosphate - 14% N; 44% P2O5  
 Kainit / Magnesium Sulphate - 11% K2O; 5% MgO  
 Lime - 52% CaO  
 Limestone - 55% CaCO3 / 29%CaO  
 Lime, algal - 30% CaO  
 Monoammonium phosphate - 11% N; 52% P2O5  
 Muriate of potash / Potassium Chloride - 60% K2O  
 Phosphate/Rock Phosphate - 25% P2O5  
 Potassium sulphate - 50% K2O; 45% SO3  
 Super phosphate - 21% P2O5  
 Triple super phosphate - 48% P2O5  
 Urea - 46.4% N

Urea ammonium nitrate solution - 32% N  
 Compost (zero emissions) - 1% N  
 Compost (fully aerated production) - 1% N  
 Compost (other non-zero emissions) - 1% N  
 Cattle Farmyard manure - 0.6% N  
 Pig Farmyard manure - 0.7% N  
 Sheep Farmyard manure - 0.7% N  
 Horse Farmyard Manure - 0.7% N  
 Poultry layer manure - 1.9% N  
 Broiler/Turkey litter - 3% N  
 Cattle Slurry - 0.26% N  
 Pig slurry - 0.36% N  
 Separated Pig slurry - liquid part - 0.36% N  
 Separated Pig slurry - solid part - 0.5% N  
 User defined Compost (fully aerated production) based fertilizer  
 User defined Ammonium sulphate based fertilizer  
 User defined Anhydrous ammonia based fertilizer

# Crop mgmt: *Fertilizers*

- *Application rate*: quantity of fertilizer product applied per unit area.
- *Application method*: select from options. Fertigation is classified as incorporation in this list.
- *Emissions inhibitors*: fertilizers with inhibitors can reduce nitrification and thus reduce nitrous oxide emissions. Check to see if your fertilizers contain these.
- *Fertilizer production*: technology used by your fertilizer supplier (if known), otherwise the default option is *current tech*.

<b>Fertiliser Use</b>  For the soil carbon effect of organic amendments to be estimated you must also complete the relevant section of the sequestration tab.							
		Fertiliser	Nutrient or product	Application rate	Unit (e.g. tonnes, kgs, pounds)	Application method	Emissions inhibitors
	Fertiliser 1	[Select]	0	0	[Select]	0	None
	Fertiliser 2	[Select]	0	0	[Select]	0	None
	Fertiliser 3	[Select]	0	0	[Select]	0	None
	Fertiliser 4	[Select]	0	0	[Select]	0	None
	Fertiliser 5	[Select]	0	0	[Select]	0	None
	Fertiliser 6	[Select]	0	0	[Select]	0	None



# Crop mgmt: *Fertilizers*

- *Organic fertilizers: e.g. compost or composted manure.* (For manure, use dry weight, about 10-15% of fresh weight).

**Fertiliser Use**  
  
 For the soil carbon effect of organic amendments to be estimated you must also complete the relevant section of the sequestration tab.

	Fertiliser	Nutrient or product	Application rate	Unit (e.g. tonnes, kgs, pounds)	Application method	Emissions inhibitors	Fertiliser production
Fertiliser 1	Compost (fully aerated production) - 1% N	N	0	[Select]	0	None	Current tech
Fertiliser 2	Cattle Slurry - 0.26% N	N	0	[Select]	0	None	Current tech
Fertiliser 3	<div style="border: 1px solid black; padding: 2px; font-size: 0.7em;">           Horse Farmyard Manure - 0.7% N            Poultry layer manure - 1.9% N            Broiler/Turkey litter - 3% N            Cattle Slurry - 0.26% N            Pig slurry - 0.36% N            Separated Pig slurry - liquid part - 0.36% N            Separated Pig slurry - solid part - 0.5% N         </div>	0	0	[Select]	0	None	Current tech
Fertiliser 4		0	0	[Select]	0	None	Current tech
Fertiliser 5		0	0	[Select]	0	None	Current tech
Fertiliser 6	[Select]	0	0	[Select]	0	None	Current tech

If you use compost or manure as fertiliser, and this practice started less than 20 years ago, be sure to add this in the sequestration tab.

– If it's a recent change and you want to account for the sequestration effect you **MUST** complete section 1a of sequestration tab, management change

– Indicate manure additions and how long ago this change was made.

Sequestration

on this page: 1. Land Use Changes 2. Management Changes 3. Tree Cropping 4. Sequestration

		How long ago was this change made? (years)	Percentage of land with practice change
Management changes	Tillage Changes	no	0 %
	Cover cropping	no change	0 %
	Compost	no change	0 %
	Manure additions	no change	0 %
	Residue incorporation	no change	0 %

# User-defined fertilizers

- If your fertilizer doesn't appear on the list, you can enter your own blend in the 'user-defined fertilizer' tab.
- Tab 'A5 user-defined fertilizer'
  - Name your fertiliser
  - Select starter material your fertiliser is based on
  - You can specify how much of each nutrient is in your particular solution.

User defined fertilizers. 1. Name any new fertilizers you wish to define in column A (rows 4-7). 2. Select what fertilizer to base this on from the drop-down list in column B. (as the red color indicates, this is required). 3. Modify the Nutrient concentrations below the table in rows 10-13, columns C, D and/or E. If you know any of the other qualities such as, in the case of compost, the C:N ratios, you may unprotect this page and enter that in the table. The password to unprotect this page is on the first tab. Any new fertilizer you add in rows 4-7 will appear in the dropdown list on the Crop Management tab.

Fertilizer name (optional)	Base	Index	Dry matter	Al	C*	N	P	K	P2O5	K2O	MgO	Na2O	Ca	CaO
		0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Name	Actual N, P2O5, and K2O values in your fertilizer - %	N	P (as P2O5)	K (as K2O)	Assumed N, P2O5, and K2O levels in your selected fertilizer	H	P (P2O5)	K (K2O)
		0	0	0		0.00%	0.00%	0.00%
		0	0	0		0.00%	0.00%	0.00%
		0	0	0		0.00%	0.00%	0.00%
		0	0	0		0.00%	0.00%	0.00%

Note: If you know the elemental values of the nutrients in your fertilizer, unprotect this page and enter that information in columns g, h, and i.

Note: N:P:K ratios are typically actually N:P2O5:K2O ratios. To convert P2O5 to P multiply by 0.44 (e.g. 10 lbs P2O5 applied x 0.44 = 4.4 lbs P applied). Similarly convert K2O to K by multiplying by 0.83 (e.g. 10 lbs K2O x 0.83 = 8.3 lbs K applied).

# Pesticides

- Each dose of pesticide counts as a separate application.
- For split applications, two applications at half the rate count as one.
- If you do tank mixes of pesticides, count each pesticide in the mix as a separate application (i.e. a mix of 3 pesticide products will count as three applications).
- The energy required to produce the pesticides will also be taken into account here.
- Not as detailed as the fertilizers section due to the vast number of agro-chemical pesticide types available.

Crop Management

YOUR RESULTS SO FAR

by land area: 118.2 kg CO2 eq Per hectare

by production: 1,181.6 kg CO2 eq Pertonne

HOME

GENERAL

CROPS

SEQUESTRATION

LIVESTOCK

ENERGY USE

PROCESSING

TRANSPORT

RESULTS

on this page: 1. Production 2. Soil 3. Fertiliser Use 4. Pesticide Applications 5. Crop Residue Management 6. Crop Management Results

Pesticide applications

Number of applications

0

# Energy

- *Who for:* Everyone who uses farm machinery
- **Complete either:**
  - **1)** Annual energy use: electricity and fuel use on farm for assessment crop.
    - Total electricity used
    - Renewable energy uses – indicate where used. Not a zero emissions but a lot lower than grid electricity.
    - Other fuel used for machinery use.

**Field Energy Use**

YOUR RESULTS SO FAR  
By land area By production

#VALUE! #VALUE!

HOME GENERAL CROPS SEQUESTRATION LIVESTOCK ENERGY USE PROCS

and/or page 1. Energy Sources 2. Machinery 3. Energy Use Results

**Annual Energy Use**

Electricity from grid or local renewables (e.g. vehicle use, lighting, heating, pumps)

Other

	Quantity	Units
Electricity use on the farm	0	kWh
Electricity from local hydro renewable energy used in field	0	kWh
Electricity from local wind used in field	0	kWh
Electricity from solar (photovoltaic cells)	0	kWh

	Quantity	Units
Diesel	0	[Select]
Petrol	0	[Select]
Biodiesel	0	[Select]
Biethanol	0	[Select]
High density biomass	0	[Select]
Fuel wood	0	[Select]
Coal	0	[Select]
Gas	0	therms
Oil	0	[Select]
Liquid Propane	0	[Select]

# Energy

OR

- **2) Machinery emissions:** use **ONLY** if you don't know your annual use of electricity, diesel fuel, petrol etc.
  - This section will calculate emissions for each machinery operation
  - Select a number of operations and a fuel quantity will appear – if you are sure this is not accurate you can change it, but please explain why in comments box.

		Number of operations	US Gallons fuel used
Tillage	chisel plough	1	2 302771734
Tillage	coulters	0	0
Tillage	disc gang	0	0
Tillage	disc harrow	0	0
Tillage	disk bedder	0	0
Tillage	field cultivator/ridger	0	0
Tillage	grain drill	0	0
Tillage	grain drill-notill	0	0
Tillage	hoe drill	0	0
Tillage	land plane/destoner	0	0
Tillage	moldboard plough	0	0
Tillage	pneumatic drill	0	0
Tillage	rod weeder	0	0
Tillage	roller harrow	2	3 068551971
Tillage	roller packer	0	0
Tillage	rotary hoe/bed tiller	0	0
Tillage	row crop cultivator	0	0
Tillage	row crop planter	0	0
Tillage	subsoiler	0	0
Tillage	sweep plough	0	0
Tillage	tine harrow/seed handling transport	0	0
Tillage	tooth harrow	0	0

**NB:** If you know your annual electricity use but not annual use of other fuels you can complete part of each section to account for this!

# Energy: allocation

- *Energy emissions allocation*: when total annual energy use for the farm is known but not for the individual crop under assessment.

A crop should be attributed only the inputs used to grow the crop. If it is not possible to discern the input amounts used per crop and only total (farm level) total amounts are available, an allocation should be used based on reasonable assumptions:

# Livestock

- *Who for:* Livestock producers (meat and dairy) only
- Complete one Cool Farm Tool for each animal type.
- *Approach:* two options
  - Snapshot: emissions from entire herd or flock at one point in time
  - Life-cycle: emissions over the entire life-cycle of the animals
- For calculation of emissions per unit of product. E.g. per dozen eggs, per litre or gallon of milk, per kg or pound of meat
- Useful to see how changes in management effect the GHG emissions.

# Livestock

- *Approach:* Life-cycle
- *Livestock type:* select from menu
  - Hens – four breed options to choose from. Selection will result in auto-fill of several details.
- *Phase durations:* define
  - Juvenile: time between birth and maturity
  - Adult productive phase: for meat animals this is the entire adult life. For dairy animals this is the time for which the animals produce.
  - Adult non-productive phase: total time out of production (add up total and enter here).
- Number of animals: in the life-cycle approach enter the same number for each phase. E.g.1) 100 hens raised from chick to hen, enter 100 for each phase. E.g.2) 100 cattle raised from juvenile to adult (2 feed phases) enter 100 into juvenile and adult phase.

Livestock

YOUR RESULTS SO FAR

#VALUE!

#VALUE!

HOME

GENERAL

CROPS

SEQUESTRATION

LIVESTOCK

ENERGY USE

PROCESSING

TRANSPORT

RESULTS

on this page:

1. Life cycle

2. Juvenile

3. Adult Productive

4. Adult Non-productive

5. Animal Residue

6. Results

This section should always be completed if using this tab

The data to the right may either represent a typical life cycle or else a snapshot

Life cycle or snapshot

Life cycle

Livestock type\*

hens

Length of phase

Time unit

Juvenile phase

0

0

Adult productive phase\*

0

0

Adult non-productive phases

0

0

Commercial Brown

you can select from a limited range of hen breeds from the drop-down list, to pre-fill dry matter intake

Number of animals

0

Number of animals\*

0

Number of animals

0



# Livestock

## Feed:

- Fill out all three sections if you have animals in different phases
- If fed entirely grain or a feed mix, enter 100% here
- If a combination of feed and grazing, enter grazing type:
  - High quality forage (e.g. vegetative legumes and grasses)
  - Moderate quality forage (e.g. mid season legume and grasses)
  - Low quality forage (e.g. straws, mature grasses)
- Access to pasture
- Specify own feed mix
  - Components used and their percentage

The screenshot shows the 'Livestock' section of an emissions calculator. The top navigation bar includes tabs for HOME, GENERAL, CHOPS, SEQUESTRATION, LIVESTOCK (selected), ENERGY USE, PROCESSING, TRANSPORT, and RESULTS. Below the navigation bar, the 'LIVESTOCK' section is active, showing a sidebar with 'Juvenile phase' selected. The main content area is divided into 'FEED CHARACTERISTICS' and 'OPTIONAL INPUTS'.

**FEED CHARACTERISTICS**

Percentage of diet from feed mix (instead of grazing):  %

Type of grazing if applicable:  Quality:  Type:  %

You may select components of your own feed mix to the right to estimate emissions for this component. If you leave this section blank emissions will be assumed for European cereal production.

**OPTIONAL INPUTS**

dry matter intake per head:  kg/day

Feed Component	Percentage	
1	<input type="text" value="0"/>	%
2	<input type="text" value="0"/>	%
3	<input type="text" value="0"/>	%
4	<input type="text" value="0"/>	%
5	<input type="text" value="0"/>	%
6	<input type="text" value="0"/>	%
7	<input type="text" value="0"/>	%
8	<input type="text" value="0"/>	%
9	<input type="text" value="0"/>	%
10	<input type="text" value="0"/>	%
Total	0 %	

# Livestock

## Manure Management:

- Select from dropdown list.
- Select the option most appropriate to the animal type under assessment.

### Manure management system

[Select]

Solid storage  
Dry lot  
Liquid slurry with natural crust cover  
Liquid slurry without natural crust cover  
Uncovered anaerobic lagoon  
Pit storage below animal confinements  
Anaerobic digester  
Deep bedding - no mixing

Livestock

YOUR RESULTS SO FAR  
by land area: - kg CO<sub>2</sub>  
by production: #VALUE! kg CO<sub>2</sub>

HOME

GENERAL

CROPS

SEQUESTRATION

LIVESTOCK

ENERGY USE

PROCESSING

on this page: 1. Life cycle 2. Juvenile 3. Adult Productive 4. Adult Non-productive 5. Animal Residue 6. Results

required for simple (Tier 1) estimate.

Optional inputs can be used to refine the estimate (Tier 2).

Manure management system	Percentage of manure managed under this system (when in use)	Number of days per year this system is used
[Select]	0	0
[Select]	0	0
[Select]	0	0
Comments on manure management: (Type over this cell to enter any comments about your manure management strategy .)		0

# Livestock: results

- *Look at life-cycle CO2-eq results at the bottom of the livestock page*

Lifecycle						
	Total in feed	Enteric	Manure Ch4	Manure direct N2O	Manure indirect N2O	kg CO2 eq
Growing phase	13,528.7	3,030.8	14.0	7.2	-	91,775.9
Productive adults	41,163.5	17,634.6	84.2	50.3	-	499,017.1
Non-productive adults	-	-	-	-	-	-
Totals	54,692.2	20,665.4	98.2	57.5	-	590,793.0

# Further assistance

- Cool Farm Institute Website [www.coolfarmtool.org](http://www.coolfarmtool.org)
  - Downloads
  - Documentation
  - Case studies
- Sylvia or Jon

**Thank you!**

**Any Questions?**

