

Dairy-4-Future – Local Farms Greenhouse Gas Emissions – Low on a Global Scale!

Dairy-4-Future is an exciting new €3.8 million Atlantic Interreg funded project, which aims to improve the sustainability of dairy farming in the Atlantic region of Europe. Through a consortium of eleven partners, from Scotland to the Azores, the Dairy-4-Future project aims to increase the competitiveness, sustainability and resilience of dairy farms in these Atlantic regions, through the development of innovative and efficient dairy systems.

At the heart of the project are a group of 100 Pilot Farmers and 10 Experimental/Demonstration Farms drawn from all the regions involved. 10 of these are local farms here in N. Ireland with CAFRE being the local demonstration farm. Detailed data on economic, environment and social sustainability aspects of dairy farming have been collected and are currently being analysed. The first set of environmental analysis results have been made available, detailing the greenhouse gas emissions (GHG) per kg of milk for the local farms participating in the project.

Local Farms GHG Emissions

Data collected from local dairy farms involved in the Dairy-4-Future project for the 2018 year have been analysed by Teagasc, Moorepark, the project environmental analysis work package leader. The Greenhouse gas emissions from dairy farming have been calculated on a carbon dioxide equivalent per kg of fat and protein corrected milk yield (CO₂eq/kg FPCM). Carbon dioxide equivalents is the convention used to equate the effects of a range of greenhouse gases emitted from agriculture including:

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous Oxide (N₂O)

The main sources and nature of the greenhouse gases emitted by dairy farming are presented in Table 1 below. Enteric fermentation (rumination activities) generates methane which is emitted mainly from the cow's mouth and accounts for over 50% of the 0.99 kg of carbon dioxide equivalents emitted for each 1.0 kg of energy and protein corrected milk yield.

Manure storage, handling and spreading generates a combination of nitrous oxide and methane. Manure management is the second largest source of GHG emissions from milk production, closely followed by fertiliser. Concentrate production is the next largest source of GHG emissions with fuel and electricity use by machinery generating carbon dioxide from burning fossil fuels accounting for less than 5% of the carbon dioxide equivalent emissions.

Table 1 N. Ireland Dairy-4-Future Pilot Farms Carbon Footprint (CO₂-eq./kg FPCM)

Dairy Farm Carbon Footprint Emissions	NI Dairy-4-Future Project Farms Average	DAERA Farm Business Survey Average 2016
Enteric Fermentation (CH ₄)	0.51	0.55
Manure (CH ₄ and N ₂ O)	0.16	0.26
Fertiliser (CO ₂ and N ₂ O)	0.15	0.15
Concentrate production (CO ₂ and N ₂ O)	0.10	0.19
Fuel (CO ₂)	0.04	0.06
Other (CO ₂)	0.04	0.03
Farm Carbon Intensity	0.99	1.24

The DAERA Economics and Statistics team, working along with AFBI, have generated a milk production carbon intensity time series showing the trends in carbon emissions per kg of milk from 1990 to 2016 from a representative sample of over 100 dairy farms in N. Ireland. The most recent 2016 data is presented in Table 1. Compared to the DAERA statistics, as expected the project farmers produce milk with a lower emissions intensity as they were selected from the top 10% of CAFRE benchmarked farms and have an average annual milk yield of over 9,500 litres.

Milk yield is an important factor in reducing the carbon emission intensity in the dairy production regions around the world. Figure 1 and Table 2 show the variation in emission intensity across the globe. The emission intensity of the least efficient milk producers in the world is more than 4 to 6 times higher than the local dairy farmers involved in the Dairy-4-Future project. The number of dairy cattle producing milk at these relatively high carbon intensity levels of over 4.0 kg is also 7 times the number of dairy cattle in Western Europe.

Figure 1. Global milk production carbon intensity, FAO 2015

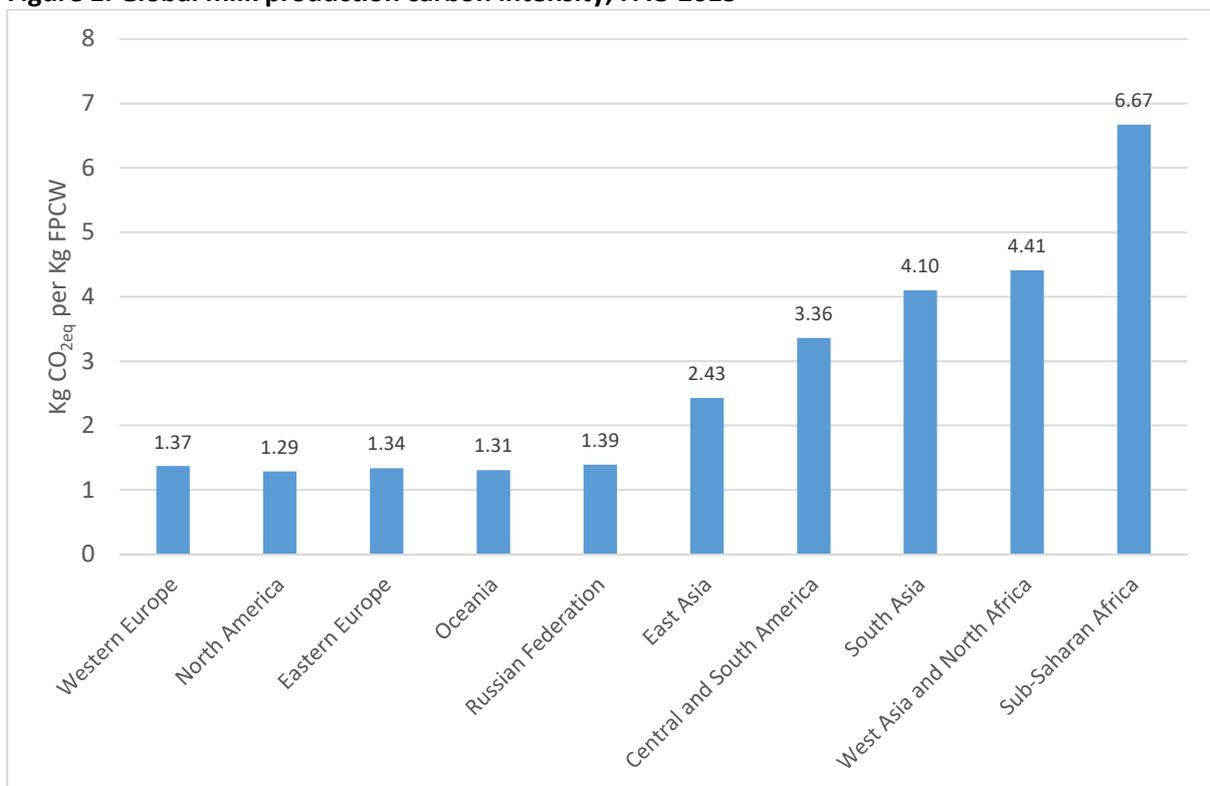


Table 2. Global milk yields and cow numbers

<i>Global Region</i>	<i>Milk yield (kg/year)</i>	<i>Cow numbers (million)</i>	<i>Cow numbers (%)</i>
Western Europe	6,957	21	8
North America	9,867	10	4
Eastern Europe	5,005	8	3
Oceania	4,659	6	2
Russian Federation	4,146	6	2
East Asia	2,907	19	7
Central and South America	1,947	42	16
South Asia	1,388	71	27
West Asia and North Africa	1,830	33	13

Sub-Saharan Africa	457	46	18
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