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# Global view of environmental impact of ruminant livestock production



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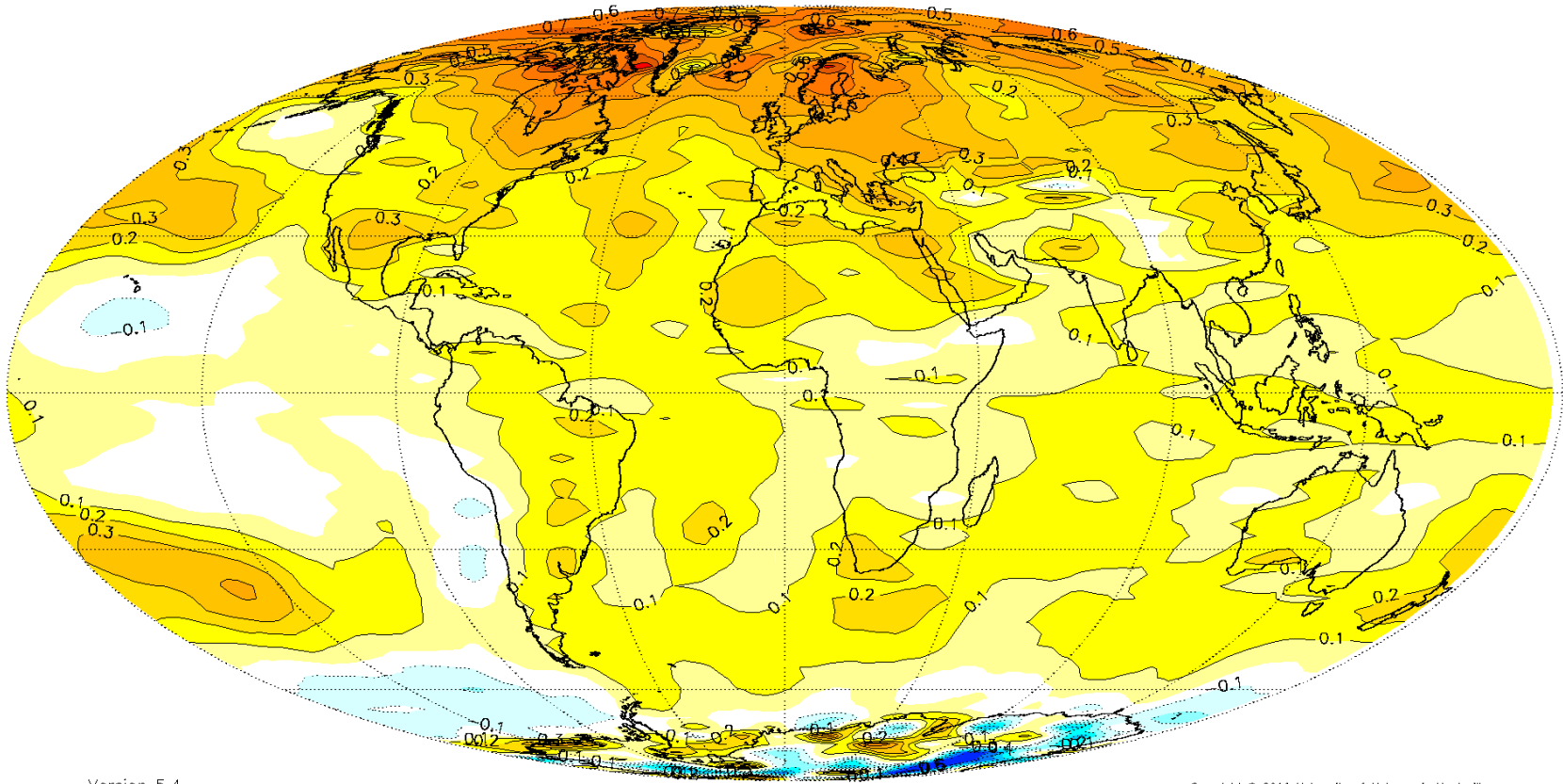
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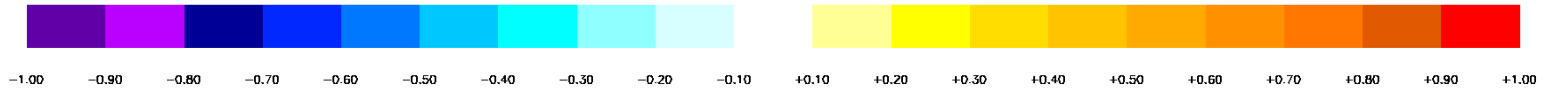
# Why are we talking about GHGs ?

Dec 1978 to Nov 2011 Trend (°C/Decade)  
LAYER = LT LOWER TROPOSPHERE



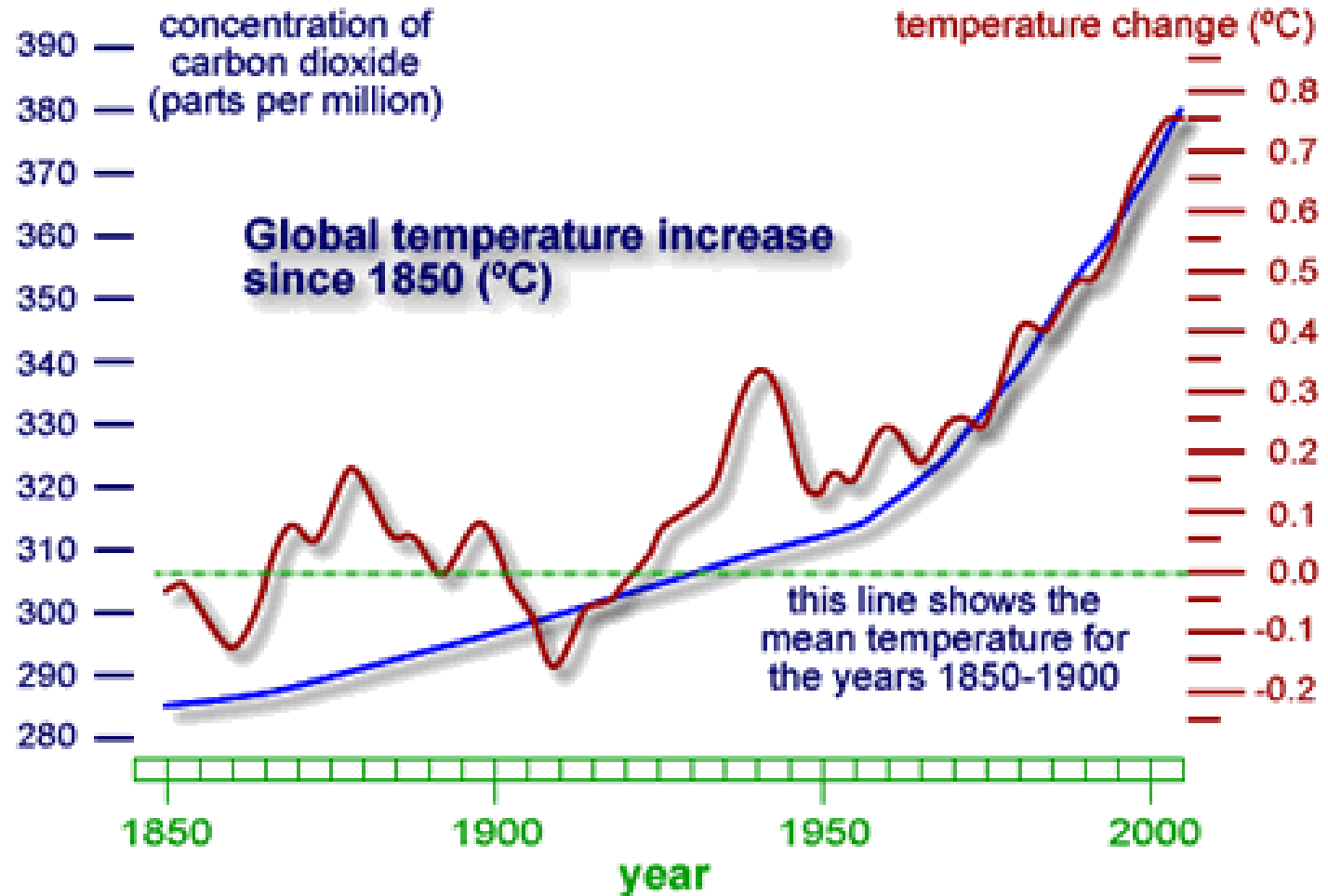
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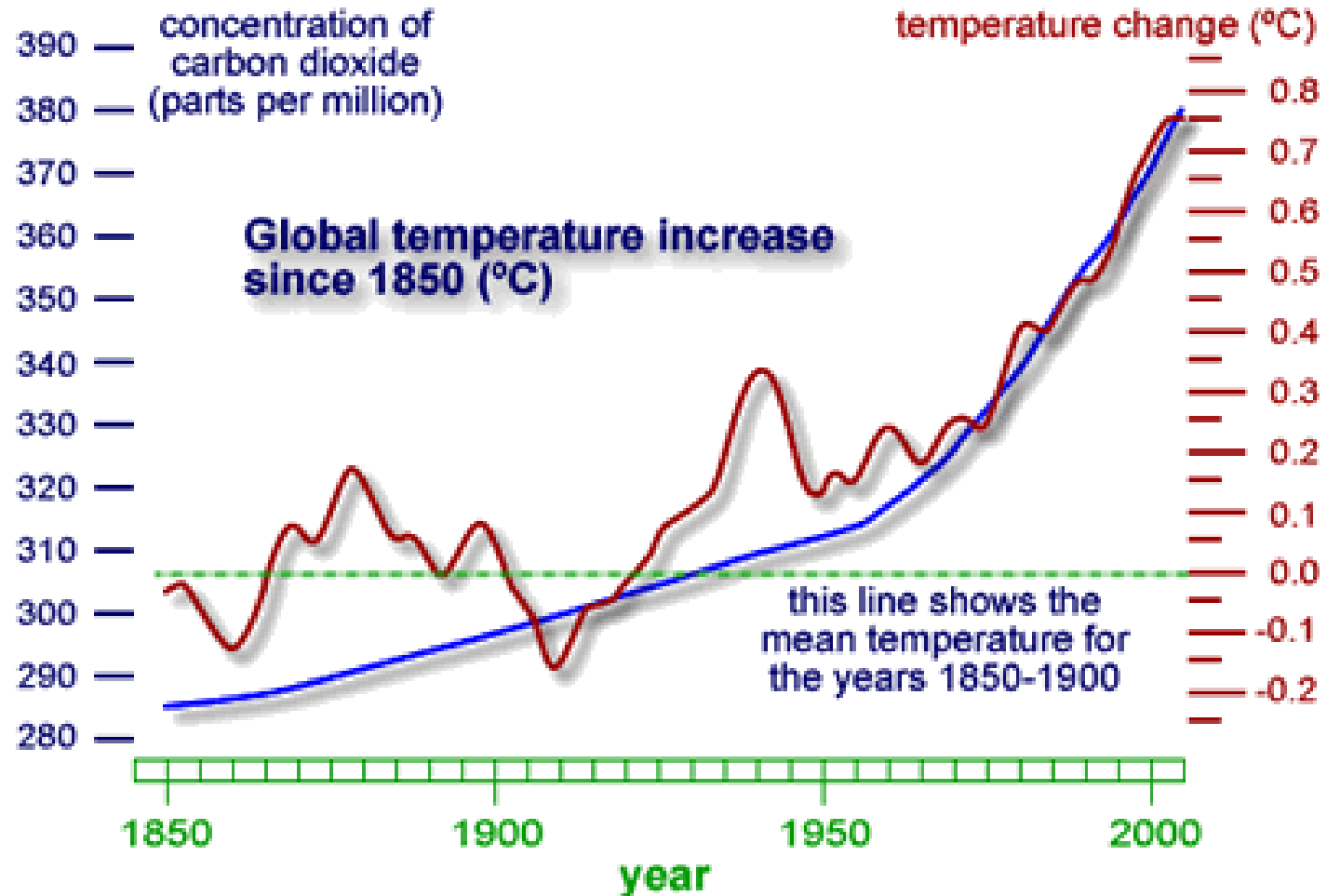
Broken lines outline areas that have a negative decadal trend; solid lines outline areas that have a positive decadal trend. Each contour represents 0.1 degree Celsius, starting at  $-0.10$  and  $+0.10$  degrees C.

*the warming trend has actually accelerated over time, from 0.06°C per decade for the past 125 years to 0.22°C per decade for the past 25 years.*



**To “hold the increase in global temperature below 2 °C” and avoid “dangerous” climate change, deep cuts in global emissions are urgently required.**

*(Copenhagen Accord, 2009)*





**Extreme weather**





**CO<sub>2</sub> - Carbon dioxide**

**CH<sub>4</sub> - Methane**

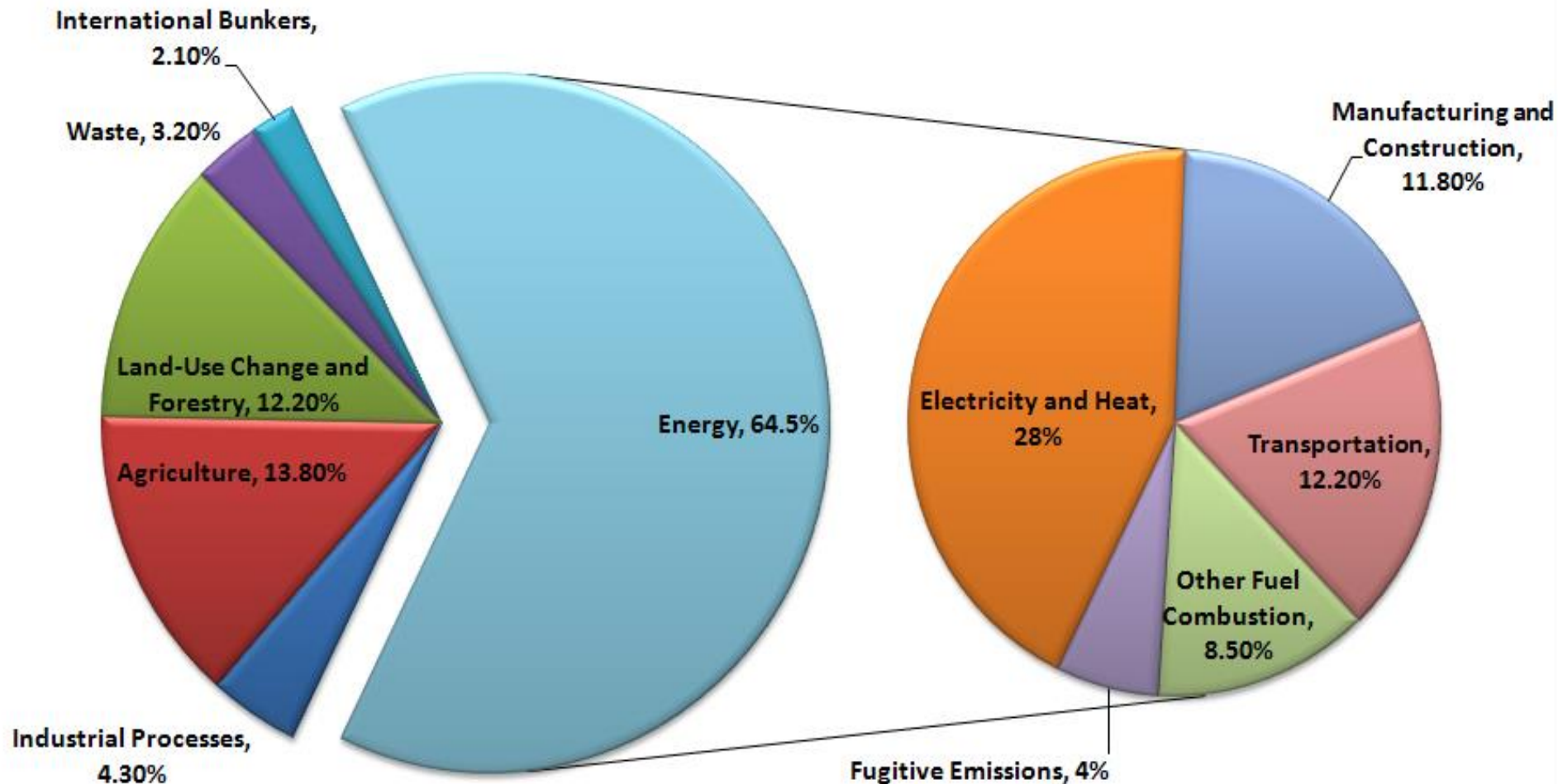
**N<sub>2</sub>O - Nitrous oxide**

**PFCs - Perfluorocarbons**

**HFCs - Hydrofluorocarbons**

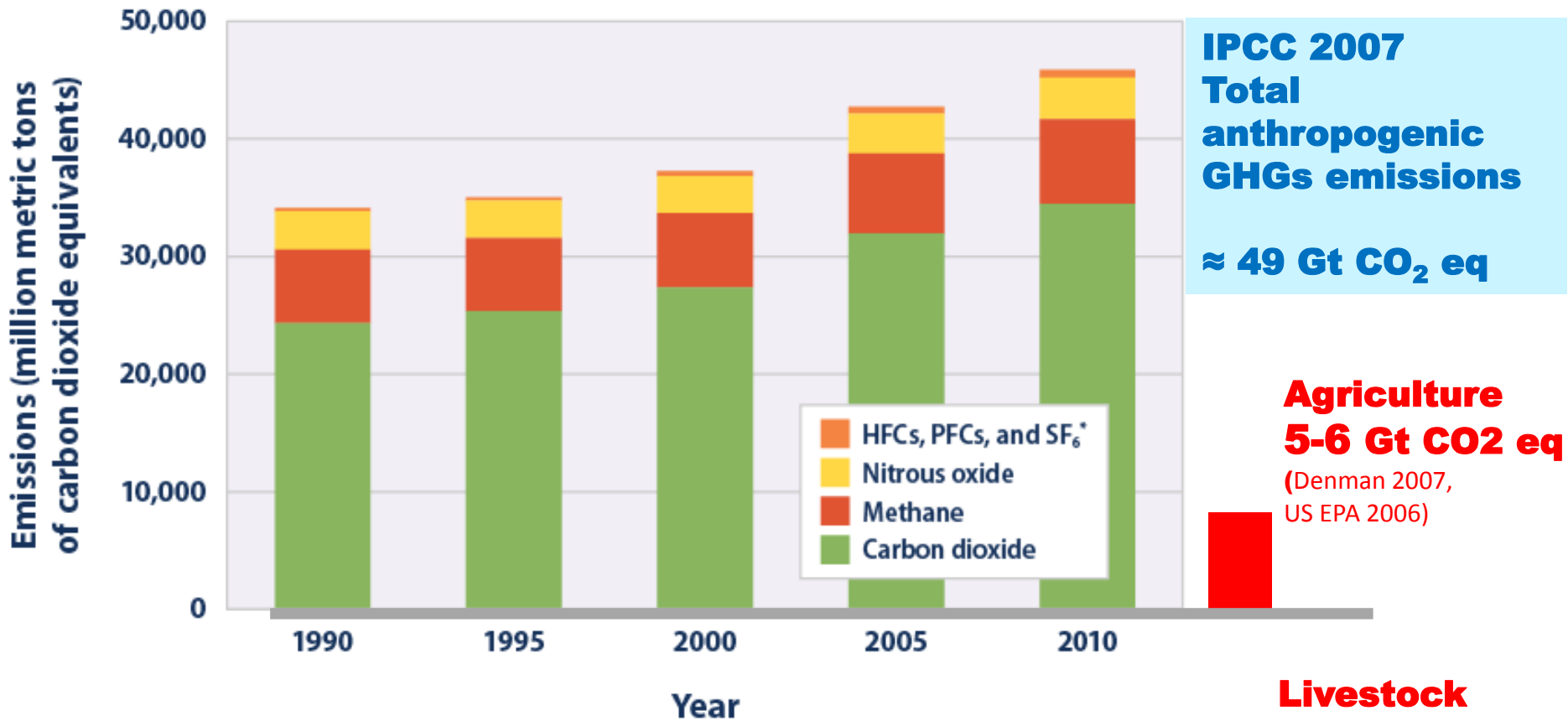
**SF<sub>6</sub> - Sulphur hexafluoride**

# Global Anthropogenic GHG Emissions by Sector 2005



**Agriculture, and related sectors, is not the main indicted but contributes significantly to GHG emissions**

## Global Greenhouse Gas Emissions by Gas, 1990–2010

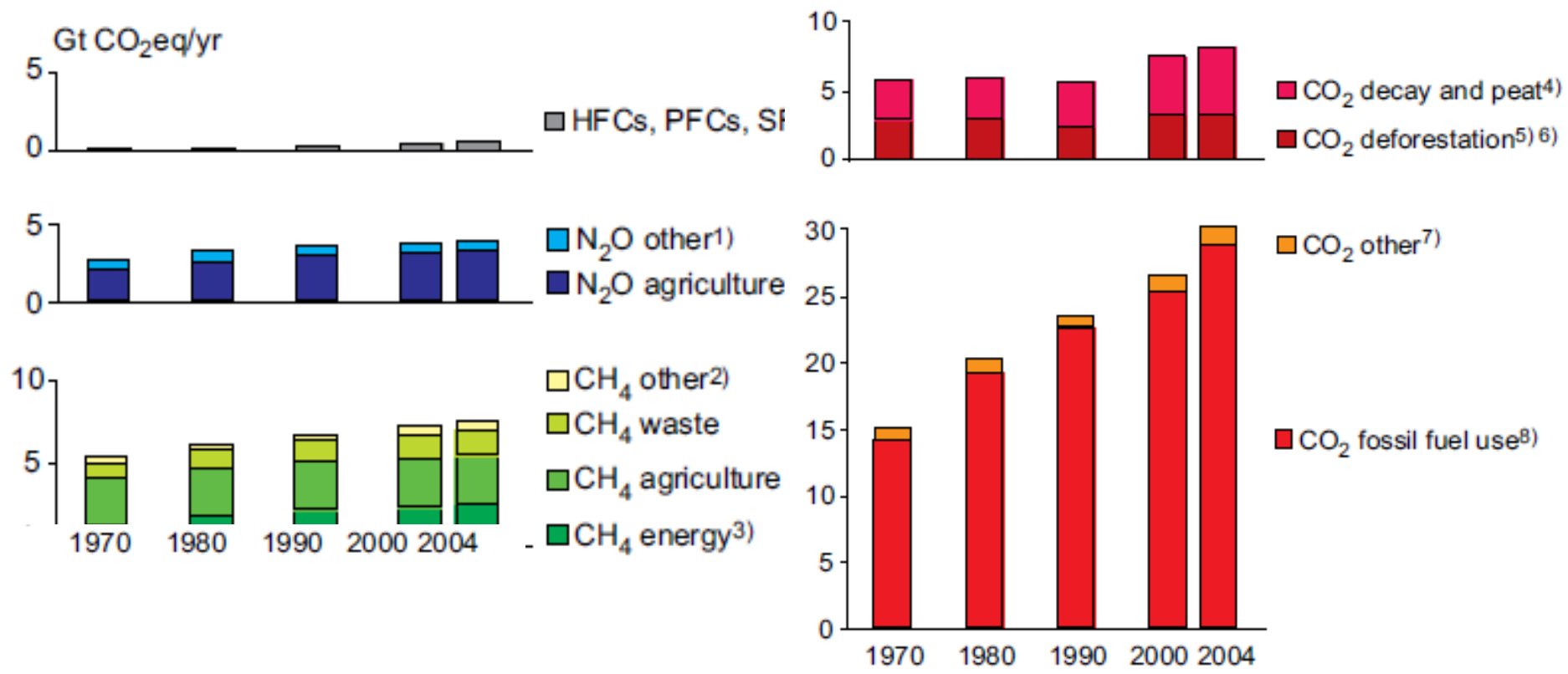


\* HFCs are hydrofluorocarbons, PFCs are perfluorocarbons, and SF<sub>6</sub> is sulfur hexafluoride.

Data sources:

- WRI (World Resources Institute). 2014. Climate Analysis Indicators Tool (CAIT) 2.0: WRI's climate data explorer. Accessed May 2014. <http://cait.wri.org>.
- FAO (Food and Agriculture Organization). 2014. FAOSTAT: Emissions—land use. Accessed May 2014. [http://faostat3.fao.org/faostat-gateway/go/to/download/G2/\\*E](http://faostat3.fao.org/faostat-gateway/go/to/download/G2/*E).





**Carbon dioxide is the largest contributor**

**Why did we focus on methane ??**

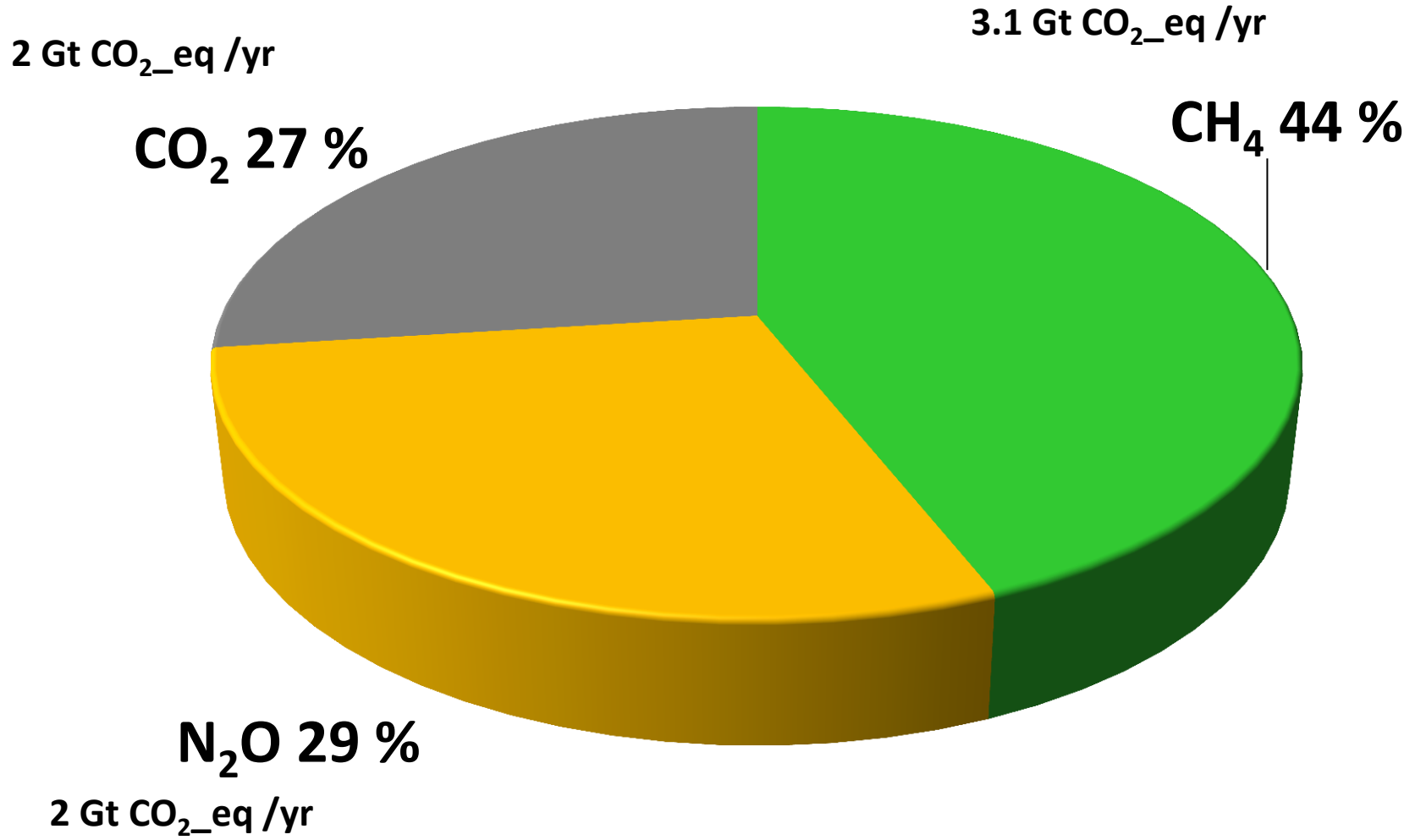
Figure SPM.1: Global Warming Potential (GWP) weighted global greenhouse gas emissions 1970-2004. 100 year GWPs from IPCC 1996 (SAR) were used to convert emissions to CO<sub>2</sub>-eq. (cf. UNFCCC reporting guidelines). CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs and SF<sub>6</sub> from all sources are included.

# Recent Greenhouse Gas Tropospheric Concentrations

GAS	Pre-1750	Recent	Increase %	GWP <sup>3</sup> (100-yr time horizon)	Atmospheric lifetime (years)	Increased radiative forcing (W/m <sup>2</sup> )
<b>CO<sub>2</sub></b> (ppm)	280	395	40	1	100-300	1.88
<b>CH<sub>4</sub></b> (ppb)	720	1850	253	23 (21/27)	9/12	0.49
<b>N<sub>2</sub>O</b> (ppb)	270	325	20	265	121	0.17

# Looking at agriculture....

Global GHGs emissions, by gas (% of the sector)



# Global emissions from livestock supply chains by category

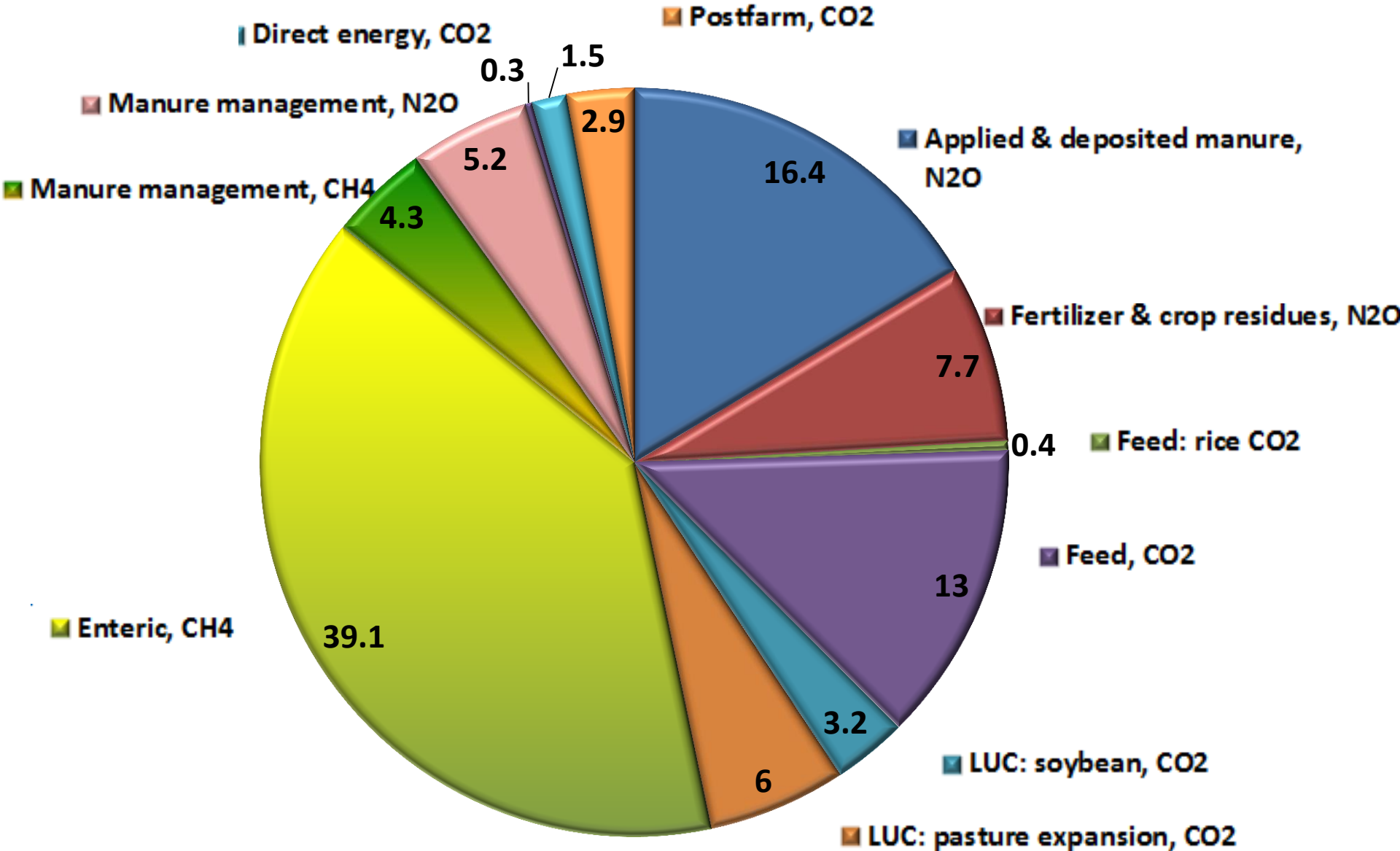
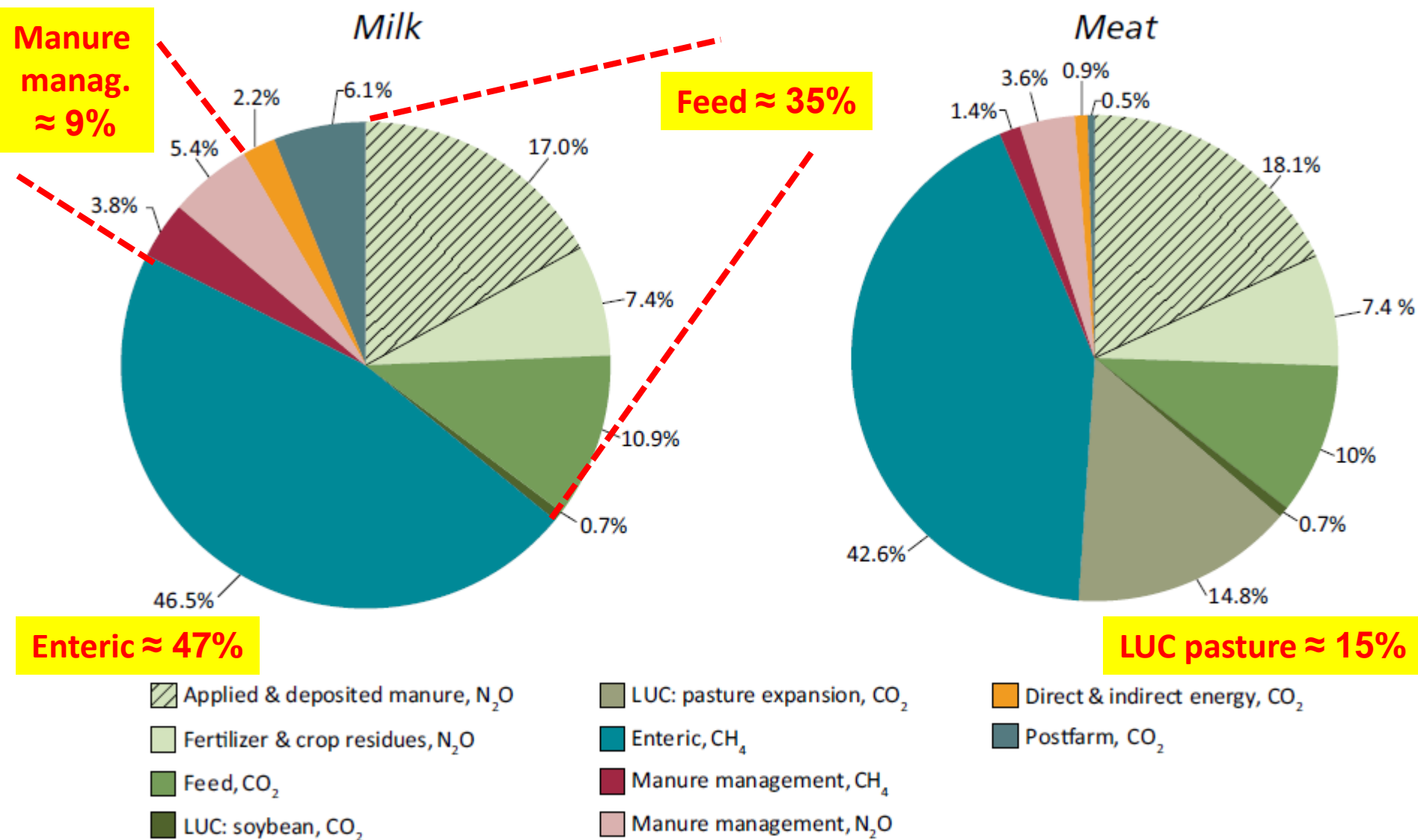
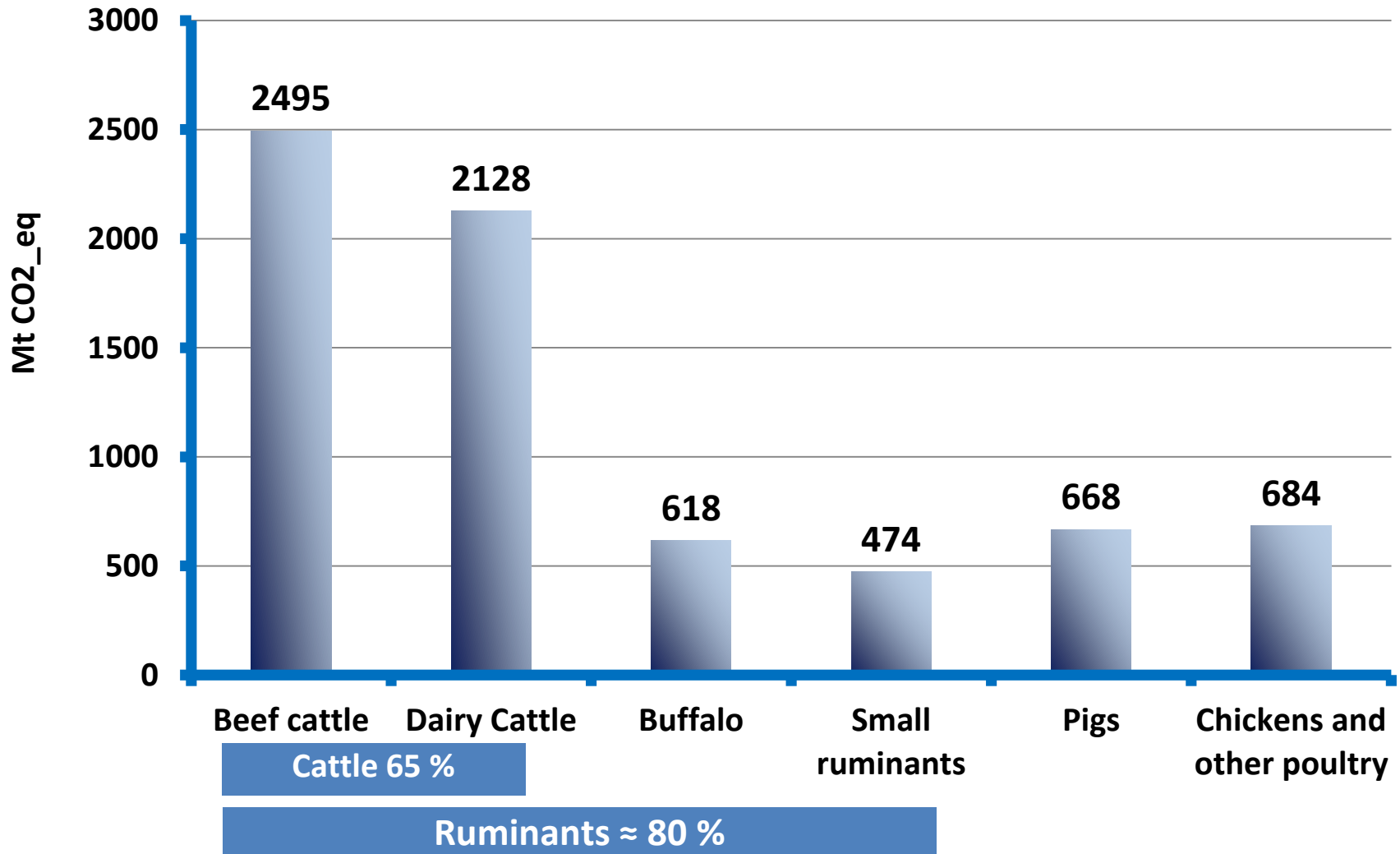


FIGURE 7. Global emissions from cattle milk and beef supply chains, by category of emissions



Source: GLEAM.

# Global emissions by species



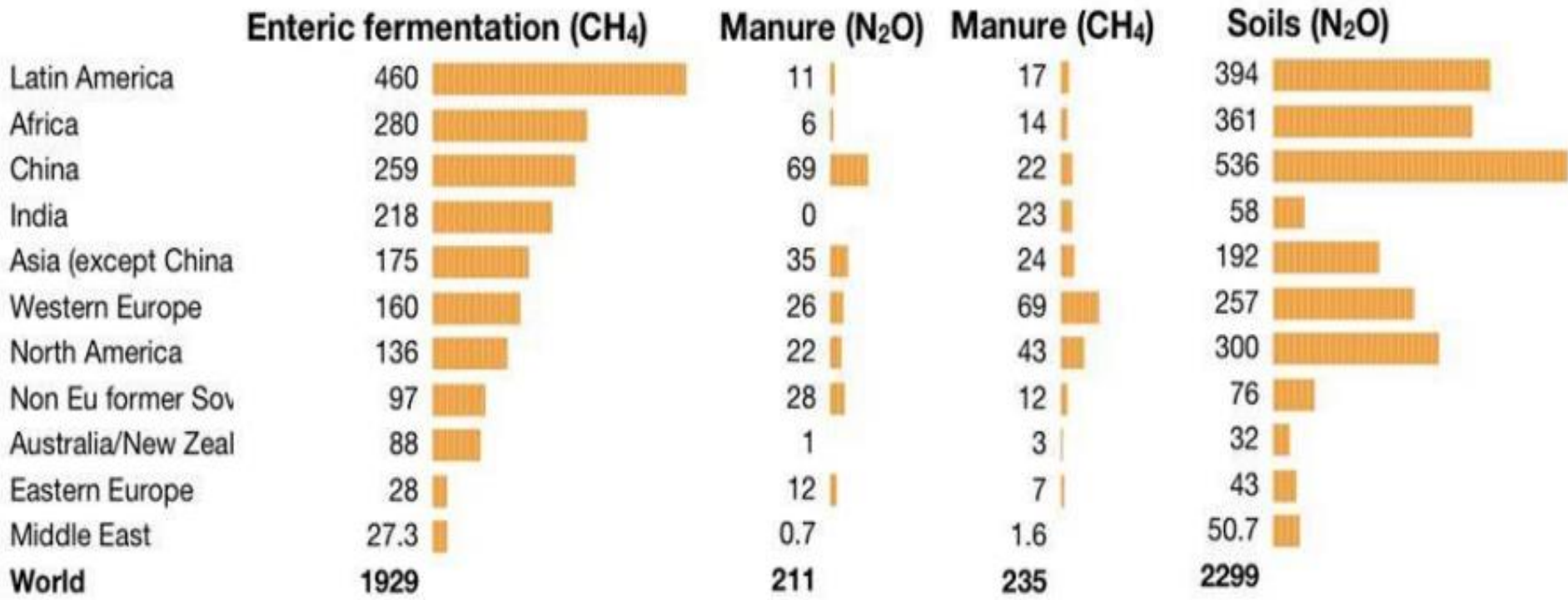
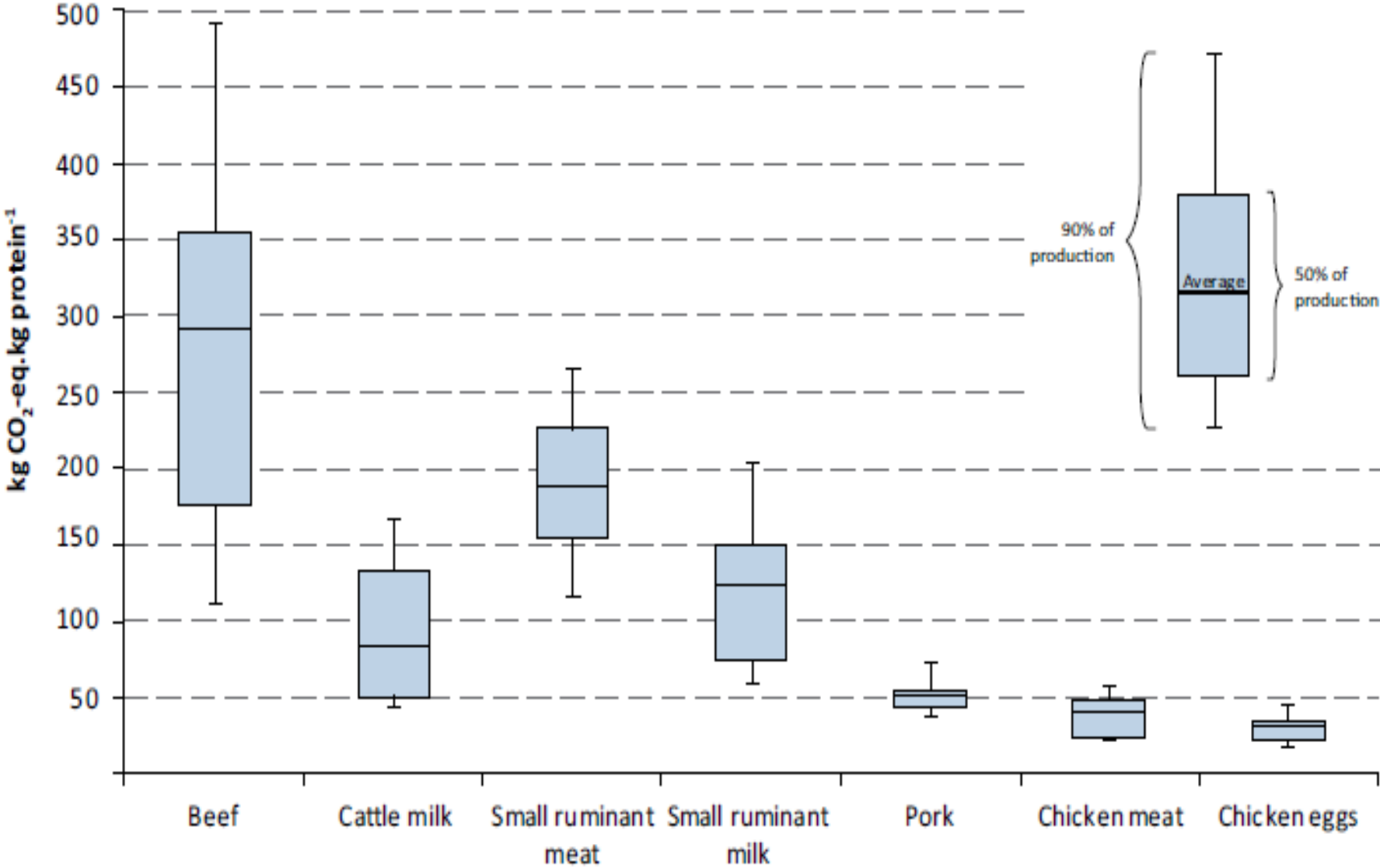


Figure 8: Regional emissions of major agricultural greenhouse gases (million tonnes of CO<sub>2</sub>-eq/year) (EPA (2006) and O'Mara (2011), re-expressed by the author)

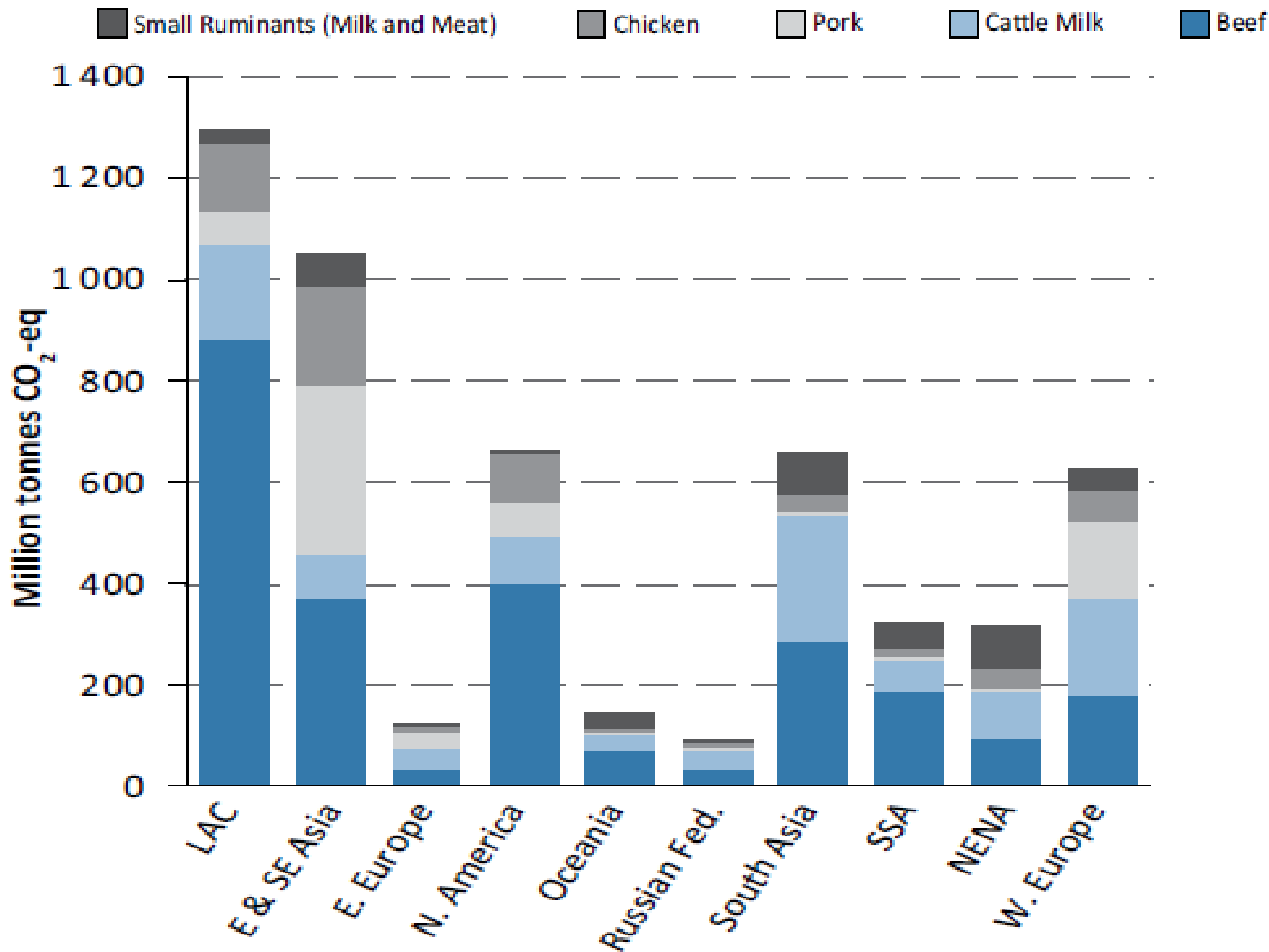
# Global emissions intensity by commodity



Source: GLEAM.

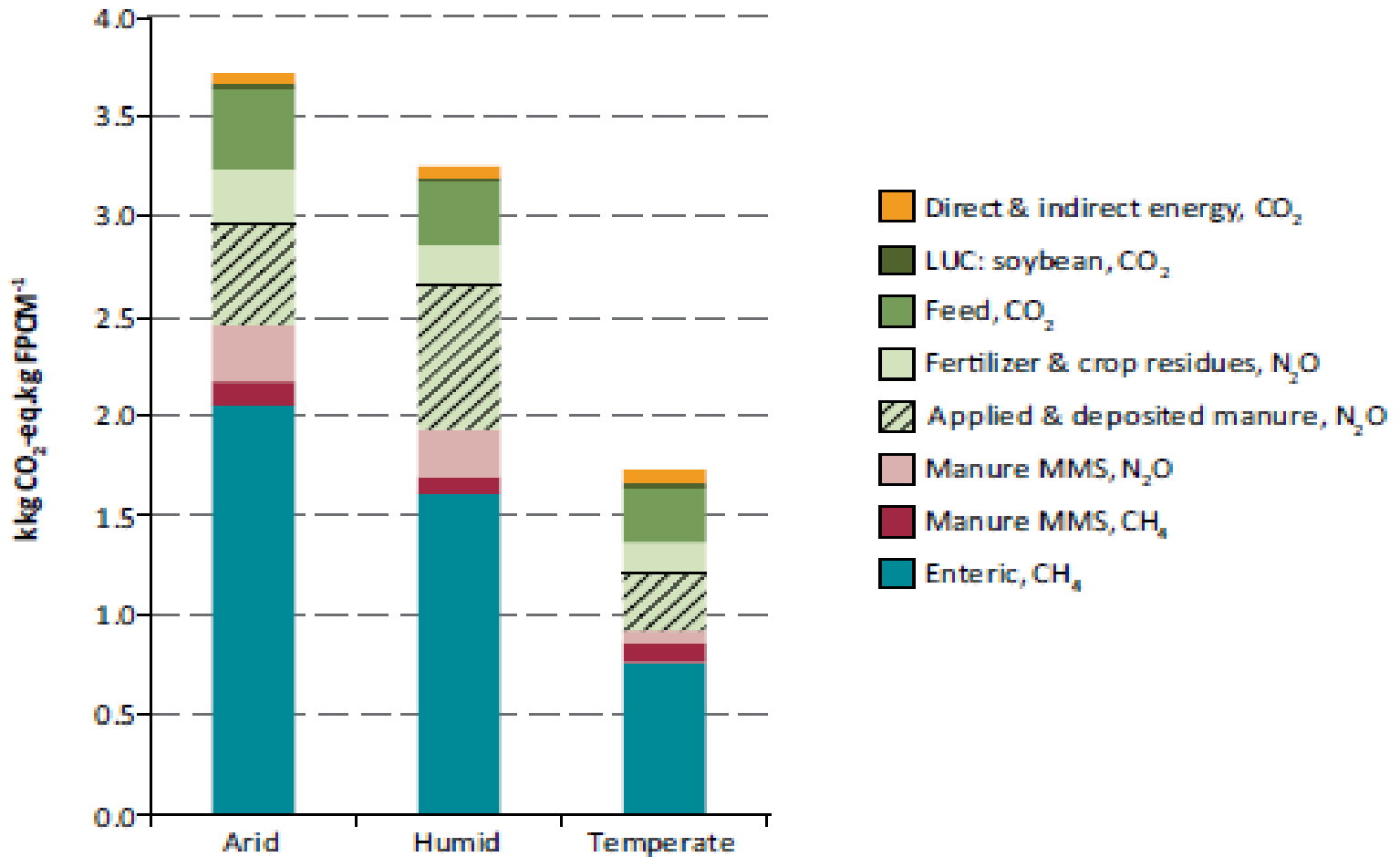


# Global livestock GHG emissions, by commodity and regions



# Emission intensities for milk by production system and agro-ecological zone<sup>1</sup>

## Mixed systems

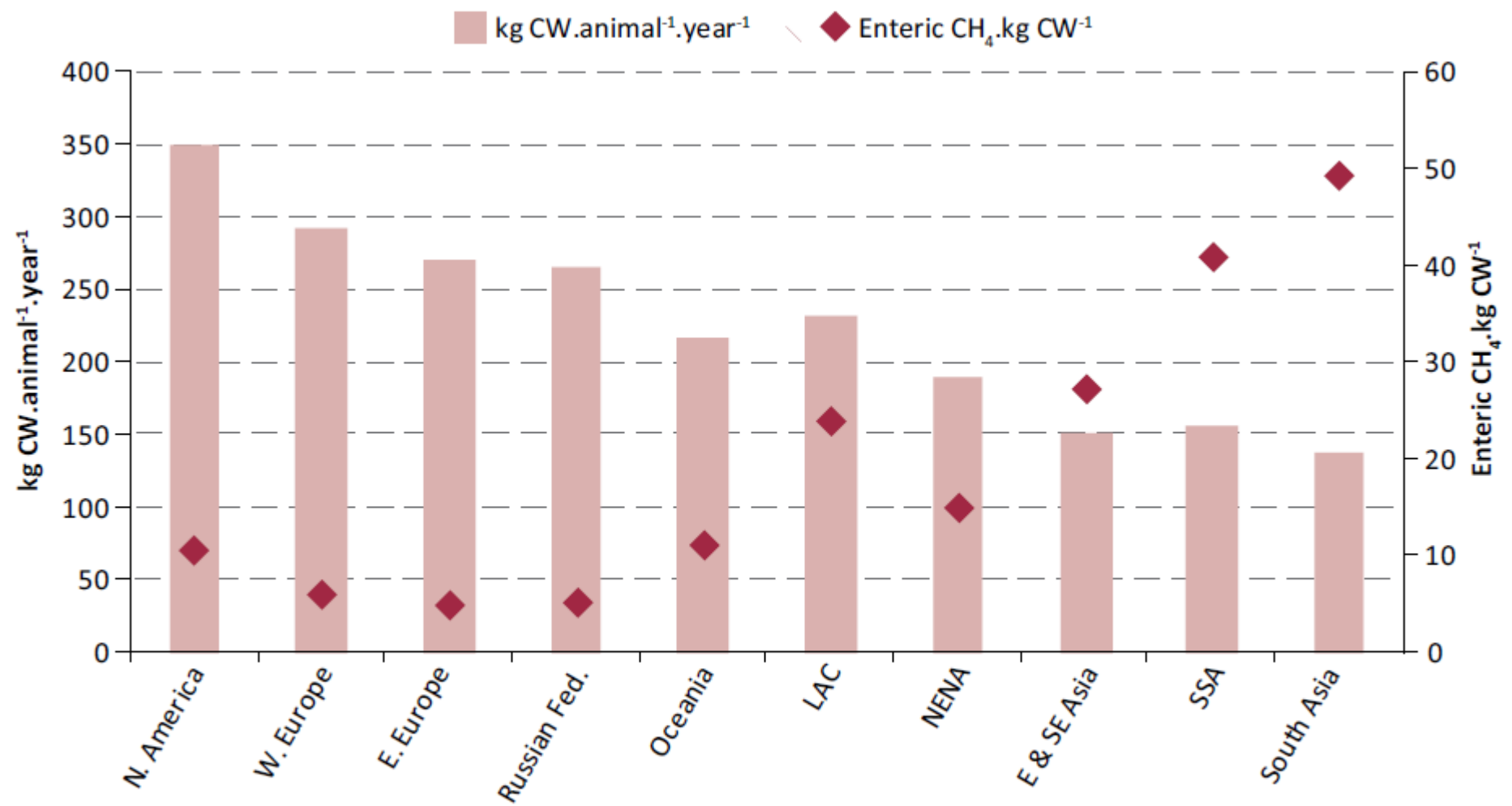


<sup>1</sup> Excluding post farmgate and land-use change emissions (pasture expansion).



Figure 25a.

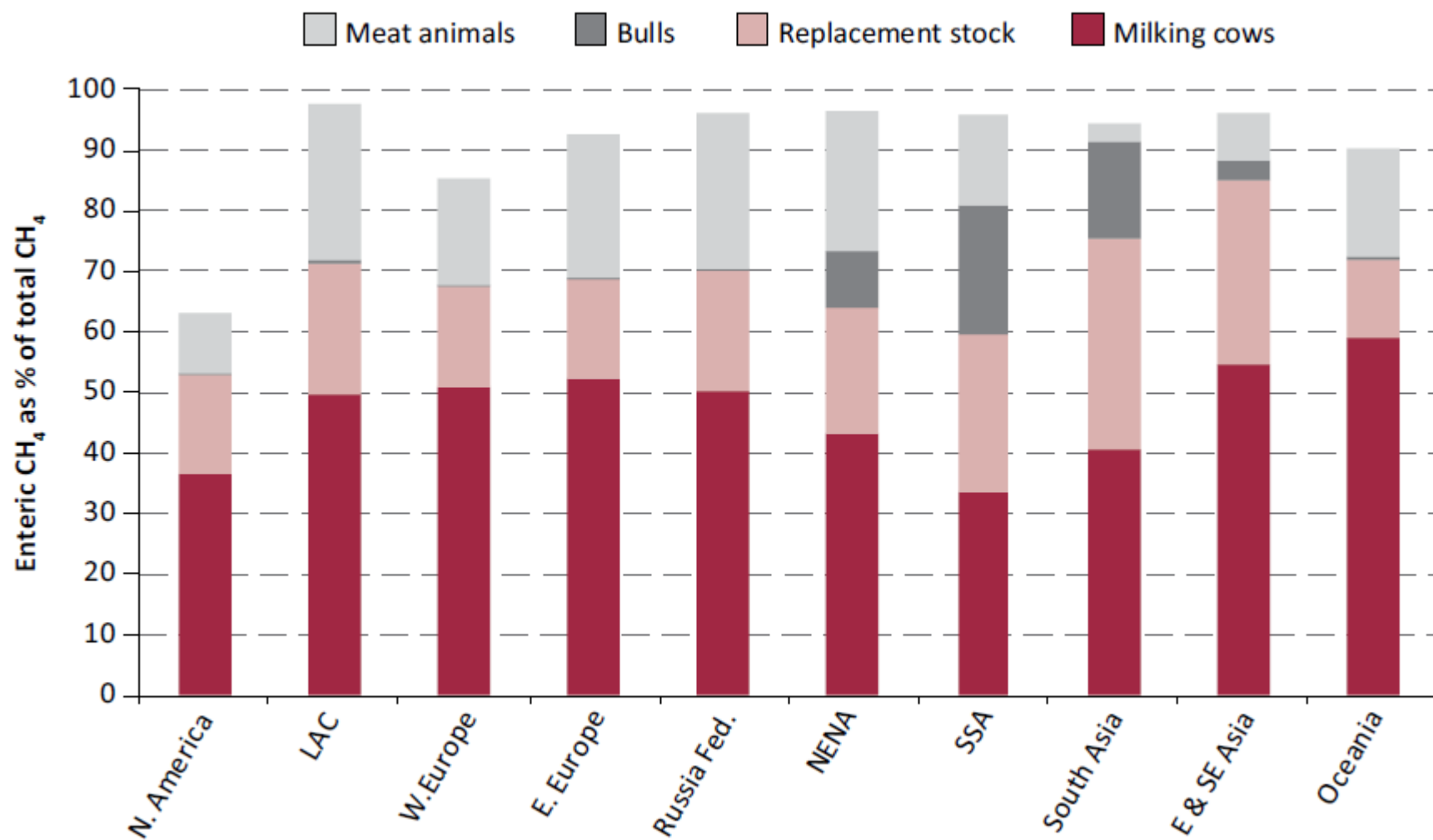
Regional variation in productivity and CH<sub>4</sub> emissions from enteric fermentation for beef herds



Source: GLEAM.

**Figure 27a.**

Regional variation in the relative contribution of animal cohorts to enteric CH<sub>4</sub> – dairy herds



**Table 7. Variation of cattle emission intensities within regions, systems and agro-ecological zone<sup>1</sup>**

	Arid			Temperate			Humid		
	10% lowest	Average	10% highest	10% lowest	Average	10% highest	10% lowest	Average	10% highest
<b>Mixed dairy</b>									
N. America	1.7	1.9	2.0	1.3	1.5	1.7	1.5	1.7	1.9
Russian Fed	1.7	1.8	1.9	1.8	1.9	2.0	1.7	1.8	2.0
W. Europe	1.5	1.6	1.8	1.5	1.6	1.7	1.5	1.7	1.8
E. Europe	1.8	1.8	2.0	1.4	1.6	1.8	1.8	1.9	1.9
NENA	1.9	4.3	9.7	2.6	3.7	5.3	2.3	3.5	9.4
E & SE Asia	2.1	2.7	3.7	1.4	2.3	2.9	1.5	2.6	3.4
Oceania	1.7	1.8	1.9	1.0	1.0	1.8	NA	NA	NA
South Asia	4.0	5.2	6.8	3.4	4.5	6.5	4.1	6.8	8.0
LAC	1.4	3.1	4.9	1.4	3.0	5.0	1.7	4.0	5.4
SSA	1.7	10.0	17.2	1.7	7.6	13.3	5.5	9.7	17.3
<hr/>									
<b>Mixed beef</b>									
N. America	28.4	32.0	36.1	26.0	28.5	30.3	26.9	28.6	30.5
W. Europe	13.6	19.9	23.0	12.9	17.3	21.9	20.2	24.1	25.7
E. Europe	11.1	12.0	12.7	12.3	13.9	16.3	11.2	11.9	12.6
NENA	17.5	28.4	35.7	16.7	20.4	25.5	18.1	24.4	34.0
E & SE Asia	36.9	46.9	61.3	33.1	43.0	54.0	40.1	54.5	81.0
Oceania	29.1	31.1	33.8	11.7	20.5	31.6	11.0	18.9	31.9
South Asia	25.3	73.0	110.5	20.4	46.8	77.6	58.8	103.0	168.1
LAC	36.5	42.9	48.5	37.4	46.6	59.0	38.2	46.8	53.9
SSA	44.2	75.0	106.6	27.4	56.0	73.0	32.9	59.7	95.3

	Arid			Temperate		
	10% lowest	Average	10% highest	10% lowest	Average	10% highest
<b>Mixed dairy</b>						
N. America	1.7	1.9	2.0	1.3	1.5	1.7
Russian Fed	1.7	1.8	1.9	1.8	1.9	2.0
W. Europe	1.5	1.6	1.8	1.5	1.6	1.7
E. Europe	1.8	1.8	2.0	1.4	1.6	1.8
NENA	1.9	4.3	9.7	2.6	3.7	5.3
E & SE Asia	2.1	2.7	3.7	1.4	2.3	2.9
Oceania	1.7	1.8	1.9	1.0	1.0	1.8
South Asia	4.0	5.2	6.8	3.4	4.5	6.5
LAC	1.4	3.1	4.9	1.4	3.0	5.0
SSA	1.7	10.0	17.2	1.7	7.6	13.3

	Arid			Temperate		
	10% lowest	Average	10% highest	10% lowest	Average	10% highest
<b>Mixed beef</b>						
N. America	28.4	32.0	36.1	26.0	28.5	30.3
W. Europe	13.6	19.9	23.0	12.9	17.3	21.9
E. Europe	11.1	12.0	12.7	12.3	13.9	16.3
NENA	17.5	28.4	35.7	16.7	20.4	25.5
E & SE Asia	36.9	46.9	61.3	33.1	43.0	54.0
Oceania	29.1	31.1	33.8	11.7	20.5	31.6
South Asia	25.3	73.0	110.5	20.4	46.8	77.6
LAC	36.5	42.9	48.5	37.4	46.6	59.0
SSA	44.2	75.0	106.6	27.4	56.0	73.0



***It's  
becoming  
hot***



***How can  
we help ?***

**Representatives of the 400 Italian cows  
thank you for your attention**

