Environmental Impacts of High-Quality Brazilian Beef Production: A Comparative Life Cycle Assessment of Premium and Super-Premium Beef

Henrique Biasotto Morais[1,*], Luis Artur Loyola Chardulo[1,2], Welder Angelo Baldassini[1,2], Isabella Cristina de Castro Lippi[2], Gabriela Belinassi Orsi[2] and Clandio Favarini Ruviaro[3]

[1]   UNESP – FCAV, Jaboticabal-SP, Brazil
[2]   UNESP – FMVZ, Botucatu-SP, Brazil
[3]   UFGD - FCA, Dourados-MS, Brazil
[*]   Correspondence: biasotto.morais@unesp.br; Tel.: +55(19)991147207

Equation		Emission fators and others Constants		
Enteric methane emissions				
10.3	Maintenance (NEm)	Cfi		
			adult female	
Chapter 10 IPCC 2006	$NEm = Cfi \cdot (Weight)^{0.75}$	0.322	non-lactating	
		0.37	adult male	
10.6	Growth (NEg)	C		
Chapter 10 IPCC 2006	$NEg = 22{,}02*(BW/C*MW)^{0,75} * WG^{1,097}$	0.8	female	
		1.0	male	
10.14	Ratio of net energy available in diet for			
Chapter 10 IPCC 2006	maintenance to digestible energy consumed (REM)			
	$REm = 1{,}123-(4{,}092*10^{-3}*DE\%)+(1{,}126*10^{-5}*(DE\%^2))-25{,}4/DE\%$			
10.15	Ratio of net energy available for growth in			
Chapter 10 IPCC 2006	a diet to digestible energy consumed (REG)			
	$REg = 1{,}164-(5{,}16*10^{-3}*DE\%)+(1{,}308*10^{-5}*DE\%^2)-(37{,}4/DE\%)$			
10.16	Gross Energy (GE)			
Chapter 10 IPCC 2006	$GE = (NEm/REM + NEg/REG)/(DE\%/100)$			
10.17	Dry matter intake: (DMI)			
Chapter 10 IPCC 2006	$DMI = BW^{0,75}*(0{,}2444*NEma-0.0111*NEma^2-0{,}472)/NEma$			
	$NEma = REM \times 18.45 \times DE\% / 100$			
10.21	CH4 emission factors for enterc fermentation			
Chapter 10 IPCC 2006	from a livestock category: (EF)	Ym		
	$EF = (GE*Ym*days)/55{,}65 \text{ MJ/kg } CH4$	0.05		
manure management				
10.22	CH4 emissions from manure management, for a defined population			
Chapter 10 IPCC 2006	$CH4Manure = EF(T)*N(T)/10^6$			
10.23	annual CH4 emission factor for livestock category (EF)	MS(T,S,k)	MCFsk	Bo(T)
Chapter 10 IPCC 2006		0.99	1.5	0.1
10.24	volatile solid excretion per day on a dry-organic matter basis	UE		
Chapter 10 IPCC 2006	$VS = GE*(1-DE/100)+(UE*GE)*(1-ASH/18.45)$	0.04		
10.25	Direct N2O emissions from manure management	MS(T,S)	$EF^3(S)$	

Chapter 10 IPCC 2006		0.99	0.02

10.30	annual N excretion for livestock category	Nrate(T)
Chapter 10 IPCC 2006	Nex(T) = Nrate(T) * TAM(T)/1000 * days	0.36