CARBON FOOTPRINT IN DIFFERENT BEEF PROCUCTION SYSTEMS IN THE PAMPA BIOME

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Introduction

The biome Pampa has a large biodiversity mainly in Brazil's south region involving the states of Rio Grande do Sul, Santa Catarina and Paraná. The natural vegetation includes mostly forest ecosystems from the Mata Atlântica, Araucária Forest and Estacionárias Forest (BEHLING et al., 2009). The biome's soil and climatic conditions allow the production of animal protein, relevant in human feeding and necessary to meet the world's demand for food and its constant growth on population.

Moreover, the pursuit of production processes able to decrease possible environmental impacts, primarily in their initial stage, such as grain crops and pastures, as in the industrial phase, is incessant.

This work had the pregnancy, calf, rearing and fattening systems as the research object, considering their high frequency in farms located in Rio Grande do Sul (SEBRAE/FARSUL/SENAR, 2005). Farming in southern Brazil is characterized by the use of natural or cultivated pastures due to suitable climatic conditions and also the small use of supplement (PAULINO; TEIXEIRA, 2009).

Therefore, measuring the different system's environmental impacts is important. However, choosing a methodology to measure and

characterize these impacts is substantial for maintaining the system's sustainability and food security.

In this sense, the life cycle analysis (LCA) methodology was applied with the participation of a multidisciplinary team. Hereupon, this study's goal was to analyze the beef cattle from the state of Rio Grande do Sul, where the biome Pampa prevails, using LCA on the three most widely used systems: Native Pasture (NP), Improved Native Pasture (INP) e Fertilized Native Pasture (FNP).

Material and Methods

This study analyzed the livestock production and its full cycle in the State of Rio Grande do Sul (Figure 1), consisting of the stages of pregnancy, growth, calf and steer. Rio Grande do Sul has approximately 13,956,953 head, representing 7% of the Brazilian production (IBGE, 2012). Even though the use of Native Pasture for livestock production is significant in the region, advances in technology are responsible for the implementation of other types of pasture, increasing the stocking rate. Thus, the fertilization of native pasture and the use other species of grasses and vegetables such as ryegrass and clover, respectively, begun (GENRO et al., 2015; RUVIARO et al., 2015; SEBRAE/FARSUL/SENAR, 2005).

The animals were Hereford breed. Also, the pregnancy and growth phases used data from Ruviaro et al. (2015), while the rearing and fattening phase used data from Genro et al. (2015). Table 1 presents the most common production systems, involving NP, INP and FNP, making a combination of these systems in 20%, 40%, 60% and 80% ratio.

Figure 1 - The Rio Grande do Sul Location, Source: Google Maps (2016)

Table 1 - Scenario combination used to calculate the GHG

Scenario	Productive Sistem
I	Native Pasture
II	Fertilized Native Pasture
III	Improved Native Pasture
IV	Native Pasture 80% - Fertilized Native Pasture 20%
V	Native Pasture 80% - Improved Native Pasture 20%
VI	Native Pasture 60% - Fertilized Native Pasture 40%
VII	Native Pasture 60% - Improved Native Pasture 40%
VIII	Native Pasture 40% - Fertilized Native Pasture 60%
IX	Native Pasture 40% - Improved Native Pasture 60%
X	Native Pasture 20% - Fertilized Native Pasture 80%
XI	Native Pasture 20% - Improved Native Pasture 80%

The weight gain varied according to the diet, and each scenario determined a different final weight, being 460 kg, 450 kg and 440 kg of live weight for NP, FNP and INP, respectively (Table 2).

Table 1 – Systems description, days of grazing, live weight gain and live weight supported

		I	II	III	IV	V	VI	VII	VIII	IX	X	XI
	days of grazing	1260	758	666	1114	1072	994	930	898	822	822	736
Calf		166	180	190	168	171	171	175	174	180	177	185
Rearing	live weight, kg	264	348	375	280	286	297	308	314	331	331	353
Fattening		460	450	440	458	456	456	452	454	448	452	444
Calf	live weight supported, kg/ha	582	814	944	628	654	675	727	721	799	768	872
Rearing		564	133	837	607	619	649	673	692	728	735	783
Fattening		564	144	837	607	619	649	673	692	728	735	783

Results and Conclusions

Depending on the degree of intensification, it's possible to note a reduction in greenhouse gas emissions. On system I, CH_4 accounted for 95% of the emissions from animals in native pasture while in system III, Fertilized Native Pasture, CH_4 accounted for 89% of the emissions (Figure 2).

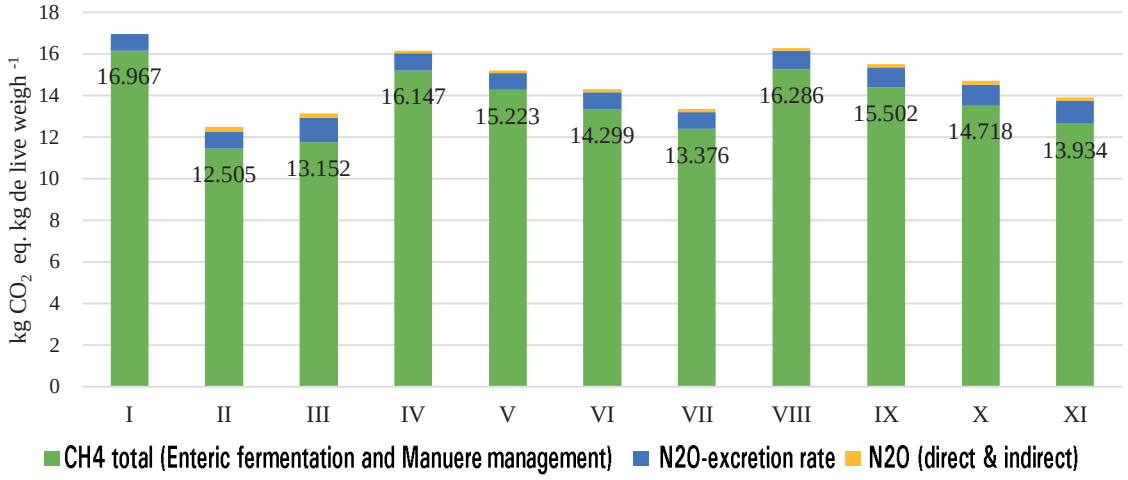

Figure 2 - Methane emissions, nitrous oxide and CO2 equivalent in the different systems

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