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BEEF PRODUCTION WITH LOW CARBON EMISSION IN TROPICAL PASTURES: A CASE STUDY FOR THE VALIDATION OF GUIDELINES

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INTRODUCTION

The guidelines for Low Carbon Brazilian Beef production are part of a set of protocols that contribute to strategies of the ABC Plan.

These guidelines are based on criteria, concepts and practices to value these more efficient livestock systems in mitigating GHG emissions by the herd during its productive cycle through the implementation of adequate practices (Almeida; Alves, 2020).

However, to date, there are no production systems in Brazil with validated LCBB guidelines, warranting research in reference areas.

This study presents the results of the first Technological Reference Unit (TRU) of Embrapa for beef production adopting the LCBB guidelines.



MATERIAL AND METHODS

Experimental area: Triunção Farm, located in Jaborandi - BA, Brazil;

Case study: began in May 2019;

Characterization of the region: the climate is Aw type and an average temperature of 24 °C. Local altitude is 933 m; average annual precipitation - 700 to 1,400 mm; water deficit - late April to October. The predominant soils are Arenosols;

Management strategies: plot with *Urochloa brizantha* cv. Marandu (115 ha), representing the general farm management (GFM); plot with *Urochloa brizantha* cv. Piatã (85 ha) managed according to technical guidelines for low carbon beef production in tropical pastures (LCBB);

Evaluated variables: dynamics of the evolution of fertility and carbon stock in the soil; height pasture; forage availability per season; cover with pasture; the animal production; evaluation of carcass; estimated of the enteric methane emissions (equation proposed by Medeiros et al. (2014) and following Alves et al. (2017)).

RESULTS AND DISCUSSIONS

Initial characterization of the soil: carbono stock in the 0-20 cm soil layer

LCBB: 20.59 Mg ha⁻¹

GFM: 18.16 Mg ha⁻¹

Cerrado vegetation: 15.18 Mg ha⁻¹

RESULTS AND DISCUSSIONS

Table 1. Variables related to pasture monitoring during the first year of applying the Technological Reference Unit (TRU), in pastures under LCBB and GFM management: pasture height (cm), ground cover (%) and forage availability (kg ha⁻¹ DM).

Month/year	LCBB			GFM		
	Height	Cover	Forage	Height	Cover	Forage
May/2019	39±6.31	86±1.14	5549±154.5	25±3.22	32±5.19	1804±46.07
August/2019	22±3.34	91±3.51	3326±447.9	13±2.21	33±3.21	1464±93.46
November/2019	27±3.45	92±3.12	4976±665.2	18±3.23	41±4.96	2237±48.11
January/2020	42±4.14	90±3.93	4218±1068	23±1.52	75±5.00	2141±108.80
May/2020	36±6.45	80±1.96	2901±704.4	25±1.98	64±4.73	1740±341.2

Mean values per plot at the sampling times.

4.34 AU ha⁻¹

1.93 AU ha⁻¹

Table 2. Animal production performance during the first year of applying the Technological Reference Unit, in pastures under LCBB and GFM management.

LCBB			GFM		
Average live weight (kg)	ADG (g d ⁻¹)	Gain per area (kg ha ⁻¹)	Average live weight (kg)	ADG (g d ⁻¹)	Gain per area (kg ha ⁻¹)
Initial	Final		Initial	Final	
259±15	414±26	440±170	241±11	391±71	430±240

155 kg

150 kg

EVALUATION OF CARCASS LCBB



Average slaughter: 573 kg
Carcass weights: 306 kg
Carcass yield: 53.4%
Type fatness: 3 (medium fat)
Maturity: two teeth
Marbling score: 7.7
Shear force: 6.3 kg

ESTIMATED METHANE EMISSIONS

	LCBB	GFM
CH ₄ day ⁻¹	169	159
CH ₄ animal ⁻¹	75.88	71.10
CH ₄ ha ⁻¹	476	181

Emission intensity **did not vary**, averaging 6.285 kg CO₂ eq. kg carcass⁻¹.

LCBB: 147% increase in the number of animals ha⁻¹ and 163% gain in kg carcass ha⁻¹.

CONCLUSION

It is possible to ensure productivity and beef quality so as to increase the profitability of the producer without giving up the maintenance or increase of the soil carbon stock and mitigation of GHG emissions, in addition to the land-saving effect.