BEEF QUALITY FROM ANIMALS RAISED IN THREE DIFFERENT GRAZING SYSTEMS

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I. INTRODUCTION

The increase in greenhouse gas emissions (GHG) is considered one of the leading causes of global warming, and enteric methane (CH_4) from beef cattle represents an important emission source in the agricultural sector [1]. In the pigeon pea (*Cajanus cajan* cv. BRS Mandarin) and *Urochloa spp*. consortium, the legume acts as a protein bank and green manure, reducing GHG emissions [2]. Intensified systems and nutritional strategies improve production efficiency and can influence meat quality. The present study aimed to evaluate the quality of aged beef produced in three pasture systems: degraded, recovered and consortium with pigeon pea.

II. MATERIALS AND METHODS

Twenty-seven *Nellore* steers, initially weighing 221±7 kg and 15-16 months of age, were distributed into three treatments with three replications: degraded pasture (*Urochloa spp*.), recovered pasture (*Urochloa spp.* fertilized with 200 kg of N/ha^{-1}) and consortium pasture with pigeon pea (*Cajanus cajan* cv. BRS Mandarin) and *Urochloa spp*., for two years. The animals were slaughtered in a commercial slaughterhouse following standards and guidelines for the industrial and sanitary inspection of products of animal origin. After 24 hours in a cold chamber, samples of the *Longissimus thoracis* muscle (between the 12^{th} and 13^{th} rib) from the left half carcass of each animal were removed and taken to the Meat Analysis Laboratory of Embrapa Southeastern Livestock, São Carlos, São Paulo, Brazil. 2.5 cm thick steaks were aged for 14 days at 0-2 °C, and the following analyses were performed at 0, 7, and 14 days: pH; instrumental color measurement, using a portable Hunter Lab Miniscan XE colorimeter to measure variations within the CIE system color space (L*, a*, b*) [3]; water holding capacity (WHC) [4], cooking loss (CL) and shear force (WBSF) [5]. The obtained data were analyzed by analysis of variance (ANOVA) using PROC MIXED in SAS software, and mean comparisons were performed using Tukey's test (5%).

III. RESULTS AND DISCUSSION

The results obtained for the meat quality traits are presented in Table 1. Based on the analyzed data, the grazing systems had no effect ($p>0.05$). On the other side, there was a significant effect ($p<0.01$) of aging times on all the meat quality traits, except for a*.

Table 1 - Quality traits of beef produced in different pasture systems.

Effects		Variables				
Grazing systems	Aging Time (days)	Color		pH	CL (%)	WBSF (kgf)
		a*	b*			
Degraded		13.32	10.80	6.05	24.23	8.35
Recovered		13.74	10.46	6.05	25.13	7.59
Pigeon pea+*Urochloa spp.*		14.09	11.32	5.97	23.01	7.71
	0	13.81	10.61^{B}	5.96^{B}	26.77^{A}	9.34^{A}
	7	13.66	11.26^{A}	6.04^{A}	23.00^{B}	8.25^{B}
	14	13.68	10.70^{B}	6.07^{A}	22.60^{B}	6.06^{C}
Average		13.71	10.86	6.02	24.12	7.89
SEM		0.20	0.25	0.04	0.71	0.40

Statistical Probabilities (P value)					
Treatment	0.2469	0.3420	0.6702	0.2546	0.6693
Aging time	0.5608	<.0001	<.0001	0.0003	<.0001
Treat.*AgingTime	0.3285	0.6256	0.8625	0.7061	0.9371

Lowercase letters differ among grazing systems (P≤0.05). Uppercase letters differ (P≤0.05) among aging times. CL = cooking loss; WBSF = Warner Bratzler Shear Force

A significant interaction was observed in L* (P=0.0484) and WHC (P=0.0241) of the meat produced in the pigeon pea + *Urochloa spp.* treatment at the 7-day aging time (Figure 1).

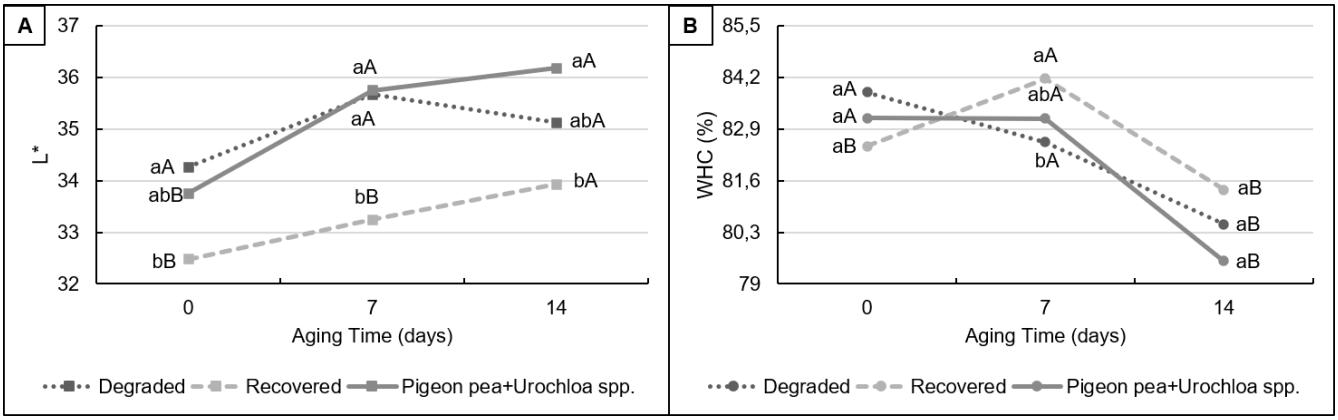

Figure 1 - Effect of the interaction between grazing systems and aging times for luminosity (L*) (A) and water holding capacity (WHC) (B) of the produced beef. Lowercase letters differ among grazing systems (P≤0.05). Uppercase letters differ (P≤0.05) among aging times.

For L*, it is observed a significant difference (p<0.05) in zero and seven days, and not at 14 days for the grazing systems (Figure 1A). For WHC (Figure 1B), the behavior between aging times and grazing systems was different: meat of animals from the recovered system showed a lower value on day zero and higher at day 7, indicating that depending on aging time, there was a difference between WHC (%) values in the grazing systems.

IV. CONCLUSION

The pigeon pea+*Urochloa spp* consortium system, in addition to being a strategy to mitigate GHG emissions, generally did not affect beef quality, except for luminosity and water holding capacity.

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