EFFECT OF ESSENTIAL OIL AND EXOGENOUS ENZYME ON MEAT QUALITY TRAITS OF FINISHING CATTLE FED DIFFERENT ROUGHAGE SOURCES

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I. INTRODUCTION

Over the last decade, the addition of antibiotics in livestock production systems has been common practice, especially when animals are reared intensively, in order to prevent diseases, metabolic disorders, and to improve feed efficiency. Public concern over routine use of antibiotics in livestock nutrition has resulted in certain countries banning their use in animal feeds, consequently, considerable efforts have been devoted toward developing alternatives to antibiotics and, in this sense, plant extracts and exogenous enzymes have an interesting role as a safe food additive [1]. However, studies on the effects of these products alone or in combination, on meat properties are still scarce. Essential oils and exogenous enzyme, like $\propto$-amylase, could have a synergistic effect, influencing animal metabolism and by consequence meat quality properties [2]. Roughage source affects DMI, and thereby intake, which ultimately affects feedlot performance and carcass characteristics. Thus, this study was carried out to evaluate the effect of two feed additives and roughage sources on the meat quality of bulls finished in a feedlot.

II. MATERIALS AND METHODS

Eighty eight Nellore bulls (358 ± 38.5 kg BW) were used in a randomized block design (initial LW) with a 2 × 2 factorial arrangement to test the effects of two feed additives (MON - Sodium Monensin 26 mg/kg DM vs. CRINA-RUM - combination of blend of essential oils - 90 mg/kg DM + exogenous α-amylase - 560 mg/ kg DM; DSM Produtos Nutricionais Brasil S.A.) and two roughage sources (CS - corn silage vs SB - sugarcane bagasse). Animals were fed diets containing 0.3% of urea, 4% mineral and vitamin mixture, 5.5% of soybean meal, corn grain (70.7 and 78.2% for CG and SB diets, respectively) and 19.5% of CS or 12% of SB for 104 days. At the end of feeding period the animals were harvested and after 24 hours of chilling pH of Longissimus muscle (LM) was measured at 12th rib level, using a digital pH meter (Hanna Instruments model HI99163; Hanna Instruments, São Paulo, Brazil). CIE L* (lightness), a* (redness) and b* (yellowness) values were measured on the surface at three random locations using a CM-2500d (Konica Minolta, Sao Paulo, Brazil) spectrophotometer with illuminant D65, a 30-mm aperture and a 10° observer angle. To determine cooking loss and Warner–Bratzler shear force, samples were weighed and roasted in an oven (Model F130/L; Flecha de Ouro Ltda, Sao Paulo, Brazil) equipped with a thermostat adjusted to 170°C. After they were cooked, shear force was evaluated using a TMS-Pro texture analyser (Food Technology Corporation, Sterling, VA, USA) with a Warner–Bratzler shear device and a crosshead speed set at 200 mm/min, chroma (C*) and hue angle (h*) were also determined as: $C^* = (a^{*2} + b^{*2})^{1/2}$; and [$H^* = \tan^{-1} (b^*/a^*)^*(360/(2^*3.14))$]. Data was analyzed using the Mixed procedure of SAS considering roughage source, feed additives and interaction as fixed and block as random effects. Differences were considered statistically significant when $P \leq 0.05$.

III. RESULTS AND DISCUSSION

No interaction or individual effects of feed additives and roughage sources were observed for the majority of evaluated traits (Table 1), except for L* value which was higher for MON compared to CRINA-RUM (P=0.028). The values of pH 24h, a*, b*, cooking loss, shear force, C* and H* was not different between MON and CRINA-RUM. Because pH 24h was not different between treatments, similar results were expected for cooking loss and shear force once they are pH dependent traits [3]. C* and H* values were not affected by feed additives. The results found in the present study are in agreement with Rivaroli [2] who also used essential oils in bovine diet and likewise did not observed changes in meat quality. There was no difference on meat quality of animals fed different roughage sources (CS and SB). Similarly, Vaz & Restle [4] concluded that the roughage used during the finishing of cattle does not alter the meat quality.

Table 1 Means, standard errors of means (SEM) and probabilities (P) of meat quality traits according to roughage source and additive

Charactheristics	Roughage		Additive		SEM	P-value		
	Sugarcane bagasse	Corn Silage	Crina-Rum[1]	Monensin		Roughage	Additive	Roughage x additive
pH 24-h	5.8	5.9	5.9	5.8	0.06	0.599	0.348	0.715
Lightness (L*)	36.7	36.8	35.9	37.6	0.54	0.890	0.028	0.815
Redness (a*)	14.2	14.4	13.9	14.6	0.46	0.772	0.300	0.652
Yellowness (b*)	12.4	12.5	12.0	12.8	0.43	0.869	0.208	0.935
Cooking loss, %	26.5	25.3	25.8	26.1	0.76	0.249	0.734	0.505
Shear Force, N	86.52	74.73	80.30	80.96	4.80	0.061	0.915	0.526
Chroma (C*)	18.8	19.0	18.4	19.5	0.63	0.811	0.251	0.832
Hue-angle (H*)	39.2	38.8	38.7	39.3	0.50	0.573	0.401	0.196

[1] Blend of essential oils - 90 mg/kg DM + exogenous α-amylase - 560 mg/ kg DM; DSM Produtos Nutricionais Brasil S.A.)

IV. CONCLUSION

The use of different sources of forage and addition of natural additives as a combination of essential oil + ∝-amylase for finishing feedlot cattle does not affect meat quality, and therefore can be used as substitute to antibiotics, maintaining meat quality properties.

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