Effect of plant extracts combined with ADE vitamins in meat quality and muscle chemical composition of Nellore feedlot cattle

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Abstract – This study evaluated the effects of four treatments: (C) Control diet including A, D and E vitamin; (V) Control diet plus 50% A, D and E vitamin; (E) Diet including 0.16% of plant extracts (DM basis); (A) Diet with association of these two additives [50% A, D and E vitamin + 0.16% of plant extract (DM basis)] on meat quality and muscle chemical composition of fifty-six Nellore young bulls. Animals were maintained in individual pens for 105 days (finishing phase). After the slaughter, carcasses were identified and cooled for 24 hours. *Longissumus* samples were obtained to determine meat quality (color, water holding capacity and shear force) and muscle chemical composition (Moisture, crude protein, ether extracts, ash). There were no effects of treatments for meat quality (P > 0.10), and muscle chemical composition (P > 0.10). In conclusion, the inclusion of plant extracts, vitamins and their associations not affected the meat quality characteristics and muscle chemical composition of Nellore cattle.

Keywords: beef cattle, meat quality, Nellore, plant extracts

I. INTRODUCTION

Plant extracts has been used on human health during a long time (4000 BC in the Eufrat and Tigris areas) because of their medicinal properties [1], however, at the last 10 years the livestock global market showed an increasing interest regarding the use of plant extracts in animal industry as a natural alternative to synthetic chemical drug and growth promoters [2]. Furthermore, the plant extracts are an inexpensive alternative and considered environmentally safe [3].

In the livestock production, plant extracts can act as functional antimicrobial agents, controlling the populations of gram + bacteria, changing the acetate/propionate ratio, reducing methanogen deamination of peptides, providing increased energy consumption and true protein in the post rumen. Consequently, animals fed with plant extracts may have greater weight gain and feed efficiency, providing a better carcass quality [4]. The objective of the present study was to investigate the use of plant extracts, vitamins A, D and E and their association on meat quality and muscle chemical composition of Nellore feedlot cattle.

II. MATERIALS AND METHODS

The study was performed at Regional Pole of Technological Development of Agribusiness – Colina, São Paulo, Brazil. Animals were cared for in accordance with acceptable practices and experimental protocols reviewed and approved by the Ethics Animal Use Committee of the Universidade Estadual Paulista. Fifty-six Nellore young bulls (aged 22 ± 2 months, initial weight ± 300 kg) were used in a complete random block design over 105 days (21 and 84 days, for adaptation and trial period, respectively). Animals were maintained in individual pens, randomly assigned to one of four treatments: (C) Control diet including A, D and E vitamin; (V) Control diet plus 50% A, D and E vitamin; (E) Diet including 0.16% of plant extracts (DM basis); (A) Diet with association of these two additives [50% A, D and E vitamin + 0.16% of plant extract (DM basis)]. The treatments provided the same diet for all animals (85 and 15%, for concentrate and forage, respectively), varying only the inclusion of the different additives. Further, all treatments received monensin (30 mg/kg of concentrate). At the end of the finishing period, the young bulls were slaughtered. Carcasses were identified, weighed and refrigerated at 4°C for 24 hours. Meat samples (2.5 cm) were obtained at *Longissimus* (left side of carcass) to determine the muscle colour (Minolta CR-410), water holding capacity , and shear force (TAX-T2 plus texture analyzer; Texture Technologies Corp, Scarsdale, NY) according to the methods previously described [5, 6]. Others *Longissimus* samples

(2.5cm) were obtained to determine muscle chemical composition according to the methods described [7]. Data were analyzed with the PROC MIXED procedure of SAS [8].

III. RESULTS AND DISCUSSION

In the current study, plant extracts combined with ADE vitamins had no effect on meat quality (P > 0.10). In muscle colorimetric measurements, L values were not affected by treatments (P > 0.10), the same was observed to intensity of color measured as "a" and "b (P > 0.10). No effects of treatments (P > 0.10) were observed for meat shear force (4.50, 5.15, 5.12, 4.95 kg/cm2 for diets C, V, E, A, respectively). Different results were observed in studies with E vitamin supplementation, which shows meat color stability in Angus Cattle [9]. In experiments with oregano essential oil, the use of plant extract changed the color of the meat compared to the control treatment, according to the authors, probably the plant extract decreased hemoglobin oxidation and activated mechanisms that modify the distribution of pigments in animal tissues, however, the same supplementation did not influence shear force of lamb meat [10]. Supplementation with plant extract and A, D and E vitamin did not alter (P = 0.75) water holding capacity when compared to control animals, unlike others studies which found increase protein deposition and improve in the water holding capacity in carcass of pigs that received plant extracts in the diet [11, 12]. In study with Angus cattle were observed increase of subcutaneous and intramuscular fat when animals received the combination of no diet supplementation of A and D vitamin [13]. In the present study, the chemical composition of the muscle was not altered by supplementation with plant extract and vitamin A, D and E (P > 0.10) (Table 1).

Table 1. Chemical composition of muscle of *Longissimus* of Nellore feedlot cattle receiving four treatments

Chemical composition (%)	Treatments				P
	C	V	E	A	
Moisture	76.63	76.65	76.23	76.23	NS
Crude protein	21.65	22.01	22.26	22.07	NS
Ether extract	13.67	12.37	12.27	12.87	NS
Ash	4.03	4.15	4.31	4.09	NS

(C) Control diet including A. D and E vitamin; (V) Control diet plus 50% A. D and E vitamin; (E) Diet including 0.16% of plant extracts (DM basis); (A) Diet with association of these two additives [50% A. D and E vitamin + 0.16% -of plant extract (DM basis)]; NS non-significant (P > 0.05)

IV. CONCLUSION

In conclusion, the inclusion in the diet of 0.16% of plant extracts combined with A. D and E vitamins not affected the meat quality and the muscle chemical composition of Nellore cattle. .

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