60th International Congress of Meat Science and Technology, 17-22rd August 2014, Punta Del Este, Uruguay

INSTRUMENTAL EVALUATION OF COLOR IN FILET OF CATTLE FINISHED ON GRAZING SUPPLEMENTED WITH CRUSHED CRAMBE

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Abstract – The aim of this essay was to evaluate the inclusion of crushed crambe replacing soybean meal in animal diets, in the color of meat from Nellore cull cows finished on pasture. The left half-carcasses, between 12th and 13th rib, were cut to expose the cross section of *Longissumus* muscle, which was collected muscle samples of approximately 0.8 kg, divided into three steaks and frozen in freezer -18°C to evaluate the qualitative characteristic of meat. The determinations of meat color and fat were made using colorimeter, where the lightness (L* 0 = black, 100 = white), the red (a*) and yellow (b*) color intensity was evaluated. No significant effect was observed to luminosity, redness and yellowness values on the filet and fat cover from Nellore cull cows with crushed crambe included in the diet. The inclusion of presscake of crambe up to 15% by replacing soybean meal in the supplement does not affect the meat color of Nellore cull cows finished on pasture.

Key Words: coloring meat, by-product, oilseeds, supplementation.

I. INTRODUCTION

Brazil has the potential of producing crushed and/or brans in the order of 14,746 kg ha^{-1} when the required blending of biodiesel to diesel was only 3% [1]. Biodiesel production is 17175.25 m³ day^{-1}, its required use of 5% biodiesel in all diesel sold in brazilian [2]. In Brazil the main raw material for oil production is soybean, responsible for over 70% of the biodiesel produced in the country. Thus, there is a search for new oilseeds for biodiesel production within the international quality standards. A little known crop in Brazil, such as crambe (*Crambe abyssinica* Hochst), emerges as an interesting alternative for the production of biodiesel.

In recent years, there has been growing interest in developing nutritional strategies for manipulating the composition of beef fatty acids, stimulated by the need to produce healthier meat and reduce its association with diseases of modern life

Thereby, oilseeds rich in polyunsaturated fatty acids as crushed crambe, may be an alternative for feeding to cattle increasing CLA synthesis in the rumen as an intermediate of the biohydrogenation of linoleic acid (C18:2 c9, c12 - ω6), which appears in high concentrations in these foods. However, according to Wood et al. [3], the changes in fatty acid composition may reflect the flavor, color and shelf life of the meat, important qualitative features to the consumer.

Through this work aimed to evaluate the inclusion of crushed crambe replacing soybean meal in animal diets in the color of meat from Nellore cull cows finished on pasture.

II. MATERIALS AND METHODS

17 samples from the fillet (*Longissimus* muscle) of Nellore cull cows, 5 years, finished on *Brachiaria humidicola* supplemented in the amount of 1.0% of body weight with crushed crambe included within 15% in the diet were used, which concentrates were isoenergetic with 80% TDN. The amount of the ingredients and chemical composition of the concentrates are described in Table 1.

Table 1. Ingredients (%) and chemical composition of the concentrates (g MS kg $^{-1}$)

	Treataments			
Ingredients	C00	C05	C10	C15
Crushed Crambe	0	5,0	10,0	15,0
Soybean meal	15,0	10,0	5,0	0,0
Whole rice bran	40,0	40,0	40,0	40,0
Corn	37,64	37,29	36,94	36,59
Urea	0,35	0,70	1,05	1,40
Salt	1,0	1,0	1,0	1,0
Limestone	2,5	2,5	2,5	2,5
Flower of Sulfur	1,0	1,0	1,0	1,0
Dicalcium phosphate	1,5	1,5	1,5	1,5
Mineral mixture¹	1,0	1,0	1,0	1,0
Parameters	Chemical Composition			
DM	926,9	936,7	923,6	922,0
CP	153,4	155,0	145,7	140,0
EE	96,0	99,1	99,8	114,3
NDF	518,7	421,0	363,9	390,8
ADF	74,9	91,1	64,7	67,1
HCEL	433,8	326,4	302,6	322,7
LIG	47,2	49,1	28,1	31,3
CNE⁺	384,2	476,3	532,3	492,6
TDN⁺	843,6	796,7	802,5	813,1
TCHO⁺	636,5	618,0	631,2	620,0
MM	137,0	126,1	123,3	125,6

C0=concentrate no crushed crambe inclusion; C5=concentrate with 5% crushed crambe inclusion; C10=concentrate with 10% crushed crambe inclusion; C15=concentrate with 15% crushed crambe inclusion. %CHOT = 10-(%PB+%EE+%MM); %CNE=%CT-%NDFp; %TDN = 9,6134+0,829DMD.

Before slaughter, animals were subjected to procedures for humanitarian stunning then the carcasses were identified and stored in cold storage at 2 ° C for 24 hours.

After cooling carcass was held in the left half-carcasses, between 12th and 13th rib, a cut to expose the cross section of *Longissimus*, which was collected muscle samples of approximately 0.8 kg which was divided into three steaks and frozen at -18°C for measurements of qualitative characteristics of meat.

Determinations of meat color were made using colorimeter, which evaluated the lightness (L* 0 = black, 100 = white), the intensity of the redness (a*) and yellowness (b*) [4]. Thirty minutes before the evaluations in different points of the samples, a cross-section to the muscle was performed to expose the myoglobin to oxygen [5]. The instrument calibration was performed before reading the samples with white and black standards.

The experiment was lead in a completely randomized design using the model:

$$Yij = \mu + \alpha i + \varepsilon(i)j;$$

where: μ = constant; αi = effect related to the inclusion level, where i = 1, 2, 3 and 4, and $\varepsilon(i)j$ = random error associated with each observation premise NID~(0; $I\sigma^2$).

III. RESULTS AND DISCUSSION

Lightness (L*), redness (a*) and yellowness (b*) in fillet have 37.41, 21.50, 11.12 of mean, respectively (Table 2).

Zebu animals, as Nellore, exhibit low deposition in the amount of intramuscular fat, but this fat deposition shall be better noted in older animals. Cerilo *et al.* [6] used sunflower cake in the diet, obtained for brightness averaging 37.48 with Nellore heifers. These values are similar to the present work.

The average of redness (a*) in the fillet was 21.50. Prado [7] justifies the rise of redness on depend the weight increase due to raise concentration of red cells pigments with increasing weight of slaughter.

The b* value typically determines the amount of yellow which is influenced by the presence of pigments such as carotene and carotenoids are deposited in fat. Therefore the results will vary due to the amount of fat in the meat. Meat tenderness is related to increased deposition of intramuscular fat, thus causing a feeling of softness when tasted and therefore the ease of disruption of sarcomeres and fibers of the meat.

Table 2. Values of ligthness (L*), redness (a*) and yellowness (b*), on fillet and fat cover of Nellore cull cows supplement with crushed crambe.

	Treatments					P<0,05	
Item	0	5	10	15	SD	L	Q
Fillet							
L	36,88	37,34	37,69	37,38	0,08	NS	NS
a	19,16	21,14	22,05	22,18	0,34	NS	NS
b	9,86	10,98	11,31	11,56	0,18	NS	NS
Fat cover							
L	70,55	70,77	70,57	70,72	0,03	NS	NS
a	7,75	7,85	8,07	8,98	0,14	NS	NS
b	25,82	25,01	20,51	23,90	0,57	NS	NS

NS – Not significant (P>0,05)

The value of lightness (L*) for fat cover was 70.66, similar to the data found in the literature, and this measurement when performed not has changes when it comes to beef fat.

The average of yellowness (b*) for fat was 23.36, this proves that the animals used in the experiment were considered adults, but even cull cows, fat cover did not show a yellowish color, so may be a good consumer acceptance and minimize the thought that fat cover with a yellowish color are very old animals.

According to Cooke et al. [8] animals fed diets with higher proportions of concentrated have more clearly fat than animals receiving diets containing fodder, this being due to the high levels of carotenoids present in the feed. Lima Júnior et al. [9] reported that consumers prefer meat with fat in white or cream color, because they identify that the yellow color would be deriving a meat by old animals finished on pasture and would be less tender.

IV. CONCLUSION

The replacement of soybean meal by crushed crambe up to 15% in the supplement does not affect the meat color of cull cows finished on pasture.

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