EFFECT OF INCLUSION OF ESSENTIAL OILS AND AGING ON COOKING LOSS OF MEAT OF CROSSBRED YOUNG BULLS FINISHED IN FEEDLOT

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Abstract- There is currently an increased consumer demand for information about consumed products, especially when it speaks to quality related to human health. The experiment was conducted to evaluate the ability of water retention and water losses by cooking of meat from cattle finished in feedlots fed levels of essential oils, in the time of 7 and 14 days of ageing. Twenty seven crossbred young bulls (F1-½ Nelore vs. ½ Angus) of 12 month-old, weight of 243.2 ± 35.3 kg, fed on a diet with 90:10 concentrate: roughage. The bulls were randomly assigned to one of three finishing diets which differed in the quantity of inclusion of mix compound essential oil (MixOil®): without addition of mix (E0.0), with 3.5 g/animal/day (E3.5) and with 7 g/animal/day (E7.0) of mix. The bulls were fed during 4 months until reach commercial weight (440.3 ± 42.7). After slaughter, the carcasses were labeled and chilled for 24 h at 4ºC and the *Longissimus* muscle was excised for evaluate on water holding capacity. The addition of essential oils at 3.5 or 7 g/animal/day in the diet of crossbred young bulls finished on intensive system and aging did not have detrimental effects in cooking loss of meat.

Key words antioxidant, *Longissimus* muscle, natural additives, probiotics

I. INTRODUCTION

Due to the risk of poisonings in human health by bacteria resistant to use of antibiotics in animal feed as growth promoters, was the prohibition of these additives in the European Union since 2006 by EFSA (European Food Safety Authority). Many researchers seek alternatives to the substitute feed additives for plant extracts.

Essential oils are natural additives that are being researched for decades in animal feeding. These additives have several functions, has the ability to improve meat quality, animal performance, and also the population of microorganisms in the rumen. Essential oils are volatile, natural, complex compounds obtained from plants or from part of them (1).

The meat quality is determined by many factors that are interdependent and interrelated, one parameter is the water holding capacity of meat. The water holding capacity of meat is related to the amount of water which is lost through the application of an external force in the muscle tissue. The lower the ability to retain water will result in more dry and less tenderness. The aim of this study was to investigate the ability of water retention and water losses by cooking of meat from cattle finished in feedlots fed levels of essential oils in time of 7 and 14 days of maturation.

II. MATERIALS AND METHODS

This experiment was conducted at the Experimental Station at Farm Iguatemi in Maringá city, Paraná, Brazil South. Twenty seven 12 month-old crossbred young bulls (F1 – ½ Angus *vs.* ½ Nellore), average weight of 243.2 ± 35.3 kg were randomly assigned to one of three finishing diets with differed in the quantity of

inclusion of mix compound essential oil (MixOil®): without addition of mix (E0.0),3.5 g/animal/day (E3.5) and 7 g/animal/day (E7.0) of mix. Component of mix consisted on seven plant extracts: oregano (*Origanumvulgare*), garlic (*Allium sativum*), lemon (*Citrus limonium*), rosemary (*Rosmarinusofficinalis*), thyme (*Thymus vulgaris*), eucalyptus (*Eucalyptus saligna*) and sweet orange (*Citrus aurantium*). Young bulls were finishing with their respective diets on intensive system (90:10 concentrate: roughage) during 4 months until reach commercial weigh (440.3 ± 42.7). After slaughter, the carcasses were labeled and chilled for 24 h at 4°C and the *Longissimus* was excised. One 2.5-cm-thick steak between the 7th and the 9th ribs were obtained, weighted, vacuum-packed and aged either 48 h and 7 or 14 days before being frozen and stored (-20ºC) during one month. Steaks were thawing during 24 hours in refrigeration conditions (4 ºC). After thawing, the steak was weight and wrapped in aluminum film. Each sample was cooked in a grill pre-heated at 200ºC until reaching an internal temperature of 70ºC monitored with a penetration thermocouple. Afterwards chill at ambient temperature. Once it reached(20°C), each steak was weight in order to calculate cooking loss.

The results were analyzed by variance analysis with SAS statistical package (Statistical Analysis System, version 8.1).

III. RESULTS AND DISCUSSION

The addition of essential oils did not affect water holding capacity (WHC) of meat (Table 1). Our finding could be expected because of the absence of differences among groups in pH, which is one of the parameters that more influence WHC, together with cut´s fibers orientation and quantity of fat (2), which was similar in meat from bulls of three diets once the bulls were the same genetic groups.

Table 1 Effect of essential oils inclusion and ageing on water holding capacity of meat from crossbred young bulls

Items	Essential oils			SEM	P-*value*	Sig.
	E0.0[1]	E3.5[2]	E7.0[3]			
pH	5.67	5.42	5.76	0.07	0.13	Ns
Cooking Loss (%)						
0 days	28.10	24.72	27.30	0.67	0.09	Ns
7 days	22.70	26.28	26.05	1.06	0.32	Ns
14 days	25.08	28.27	29.37	0.99	0.18	Ns
SEM	1.06	0.91	0.79			
P-*value*	0.11	0.29	0.23			
Sig.	ns	ns	Ns			

[1]Without essential oils;[2]3.5 g essential oils/animal/day; [3]7.0 g essential oils/animal/day. SEM: Standard error of mean. ns: not significant; **: p< 0.010.

In relation to values from the different types of losses in WHC, they presented a high variation depending the breed studied (3). In continental breeds, Serra (4) reported values between 22.91-24.62% for cooking loss, values lower than our results. Chambaz (5) found statistical difference in cooking losses among breeds; being Angus that showed the highest percentage (20.6% at 14 days of ageing). Gomes (6) reported cooking losses of 22.6% and 21.4% of average for 1 and 7 days of ageing in Nellore steers and Pflanzer (7) in Nellore purebred reported cooking losses between (27.8-31.5%). So, our values could be considered as normal.

IV. CONCLUSION

The addition of essential oils at 3.5 or 7gr/animal/day in the diet of crossbred young bulls finishing under intensive conditions did not differ on water holding capacity.

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