P-06-25

Relations among fatty acids of aged beef from nellore steers fed protected linseed oil during periods before slaughter (#510)

Fabiane S. Costa[1], Thiago M. Pivaro[2], Emanuel A. Oliveira[2], Wignez Henrique[3]

[1] Fine Instrument Technology, São Carlos, Brazil; [2] UNESP, Jaboticabal, Brazil; [3] APTA, São José do Rio Preto, Brazil

Introduction

The inclusion of vegetable oils in diet is being highly use due to the effective change in the composition of beef intramuscular fat, and the linseed oil is rich in n3 fatty acids (FA), about 58%. The aim of this study was to assess the time required, prior to slaughter, to feed beef cattle with protected linseed oil in order to modify the FA relationships and the influence of aging on these relations.

Methods

Twenty-eight Nellore steers, averaging 397.74 ± 14.07 kg and 18-month-old, were used on this study. The animals were fed with protected linseed oil during 0, 35, 70 or 105 days prior to slaughter. Animals were slaughtered and carcasses were chilled for 24 h; *longissimus* muscle was separated in steaks, vacuum packaged and aged for 0, 7 or 14 d at 2 . After aging, the FA were extracted (Folch et al., 1957), and methyl esters were formed (Kramer et al., 1997). The FA were identified and quantified by gas chromatography (GC-2010 Plus - Shimadzu AOC 20i auto-injector) with a SP-2560 capillary column (100 m × 0.25 mm diameter, 0.02 mm thick, Supelco, Bellefonte, PA). The relations among FA were calculated.

The experiment was set up as a completely randomized block (initial body weight) design, using times of providing protected linseed oil (PLO), aging periods and interaction in the statistical model.

Results

There was no interaction between polyunsaturated:saturated (PUFA:SFA) and n6:n3 FA ratios. The time of PLO provided to steers did not affect the PUFA:SFA relationship on beef steaks (Table 1).

The n6:n3 FA ratio decreased linearly with increasing time of providing PLO to steers (Table 1). Thus, prolonging the supplementation of linseed oil prior to slaughter, the meat would obtain a FA relation closer to the recommended, that should be below 4:1 (Wood et al., 2008). Higher n6:n3 ratio is a risk factor for the development of cancer and coronary heart disease. Therefore, a way to improve this relation and to make them closer to the optimum level, making the beef a more balanced food from the point of view of human health, would be the inclusion of vegetable protected oils in the ruminants diet, including linseed oil, which have high amounts of polyunsaturated FA, mainly of n3 and n6 family.

For aging period, no differences were found for n6:n3 ratio (Table 2).

The relation of PUFA:SFA decreased quadratically with a longer aging period. The proportion found in this study was lower than the recommended, which would be equal or above 0.40 (Wood et al., 2008).

Significant interactions were observed between unsaturated:saturated - UFA:SFA ($P<0.01$) and monounsaturated:polyunsaturated FA ratios ($P<0.01$) (Figure 1).

A linear effect ($P<0.05$) for aging period was observed within all treatments between UFA:SFA and PUFA:SFA ratios. Within the aging period 0 and 7 d, a linear effect of PLO supplementation time was also observed ($P<0.05$) for these same variables, meanwhile no differences were found for 14 d of aging ($P>0.05$).

Conclusion

Provide protected linseed oil on diet for steers up to 105 d before slaughter is detrimental to some relations between FA on meat and aging process accentuates this negative effect.

ACKNOWLEDGMENTS: The authors are thankful to the Sao Paulo Research Foundation (FAPESP) for providing financial support (2010/07951-2 and 2017/15336-5).

References

Folch, J., M. Lees, G.H. Sloane Stanley. 1957. A simple method for the isolation and purification of total lipides from animal tissues. J. Biol. Chem. 226:497–509.

Kramer, J.K., V. Fellner, M.E. Dugan, F.D. Sauer, M.M. Mossoba, M.P. Yurawecz. 1997. Evaluating acid and base catalysts in the methylation of milk and rumen fatty acids with special emphasis on conjugated dienes and total trans fatty acids. Lipids. 32:1219–1228.

Wood, J.D., M. Enser, A.V. Fisher, G.R. Nute, P.R. Sheard, R.I. Richardson, S.I. Hughes, F.M. Whittington. 2008. Fat deposition, fatty acid composition and meat quality: A review. Meat Sci. 78:343–358.

Notes

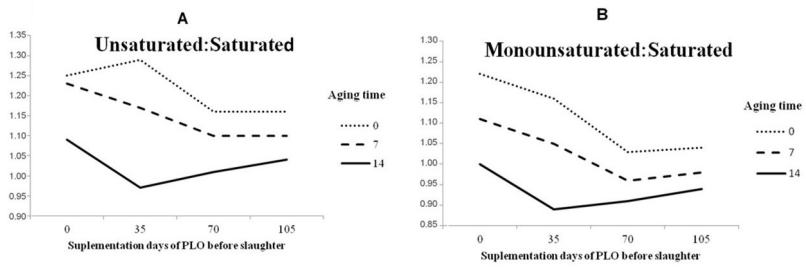

Figure 1 Unsaturated:saturated (A) and monosaturated:saturated (B) fatty acids on meat aged for 0, 7 or 14days, from Nellore steers supplemented with protected linseed oil (PLO) during different periods before slaughter (days).

Relation	Aging days			Probability of Regression	
	0	7	14	Linear	Quadratic
Polyunsaturated:Saturated	0.13	0.13	0.09	<.01	0.01
n6:n3	8.47	8.33	8.41	0.56	0.26

Table 2. Relations between longissimus fatty acids on meat aged for 0, 7 or 14 days from Nellore ste

Relation	Days of protected linseed oil offered before slaughter				Probability			
					Regression			Interaction
	0	35	70	105	Linear	Quadratic	Cubic	
Polyunsaturated:Saturated	0.12	0.11	0.12	0.12	0.96	0.75	0.12	0.07
n6:n3	10.89	9.07	7.21	6.44	<.01	0.11	0.43	0.59

Table 1. Relations between longissimus fatty acids on meat of Nellore steers fed protected linseed o

Notes