EFFECT OF FUNCTIONAL OILS OR MONENSIN ASSOCIATED WITH NDFf LEVELS ON FATTY ACIDS PROFILE OF NELLORE BULLS

Elaine Magnani[1], Nara R. B.Consolo[1*], Angelica S.C. Pereira[1], Laura B. Tosetti[1], Adrielle M. Ferrinho[1], Renata H.B. Arnandes[2],Wignez Henrique[3], Paulo R. Leme[1]

[1]Department of Animal Science, University of São Paulo, Pirassununga/SP, Brazil;

[2]Animal Science Institute, Center APTA of Beef Cattle, Sertãozinho/SP, Brasil.

[3]Animal Science Institute, Center APTA of Beef Cattle, São José do Rio Preto/SP, Brasil.

*Corresponding author email: nara.consolo@hotmail.com

Abstract – The aim of this study was to evaluate the effect of the use of additives, the increasing levels of neutral detergent fiber from forage (NDFf) and the NDFf*additives interaction in fatty acid profile of the Nellore cattle. Thirty Nellore young bulls were randomly assigned to pens in a 2 × 3 factorial arrangement of treatments. The factors were two food additives, functional oils (500 mg/kg DM, a blend of castor oil and cashew nut shell liquid, Essential, Oligo Basics, Brazil) and monensin (30 mg/ kg DM), and three NDFf levels, 6, 9 e 15% on DM basis. After 24 h postmortem the longissimus muscle was sampled to evaluated fatty acids profile. The blend of castor oil and cashew nut shell liquid decreased omega-3 and when functional oils were associated with 6% NDFf there was an increase in MUFA.

Key Words – Fat composition, Functional oil, Fiber levels.

I. INTRODUCTION

Consumers concern about nutrition value of meat, especially about the saturate fatty acids (SFA) composition. The fatty acids (FA) profile can be manipulated by diet and genetic groups. Depending on the type of supplement, the polyunsaturated fatty acids (PUFAs) and monounsaturated fatty acid (MUFAs) can increase, improving the meat health quality standards. Feeding high energy diets for finishing cattle have been largely used to improve the performance and finish faster the animals to slaughter. However, high energy diets can lead to metabolic disorders, such as acidosis, and to keep ruminal environment healthy, feed additives have been tested. The most intensively used additive, monensin, is limited in in some countries and functional oils has been shown as a natural alternative product that demonstrate potential as modulators of ruminal fermentation. Some authors reported the effect of function oills on ruminal healthy and digestibility. However, there is no data reporting effects on meat fatty acids profile. Therefore, the aim of this study was to evaluate the effect of the use of additives, the increasing levels of neutral detergent fiber from forage (NDFf), and the NDFf*additives interaction in fatty acid profile of the Nellore cattle

II. MATERIALS AND METHODS

Thirty Nellore young bulls were randomly assigned to the pens, in a 2 × 3 factorial arrangement of treatments. The factors were two feed additives functional oils (FO,500 mg/kg DM, a blend of castor oil and cashew nut shell liquid, Essential, Oligo Basics, Brazil) and monensin (MON,30 mg/ kg DM), and three NDFf levels,6, 9 and 15% on DM basis. After 105 days on feed, the animals were slaughtered and after carcasses were cooled for 24h at 2ºC, a 2.5cm thick steak was removed between the 12^{th}-13^{th} ribs, Longissimus muscle was isolated, vacuum packed, and frozen at -18°C. The FA were extracted and methylated using the method of Folch et al. [1] and Kramer et al. [2], and it was quantified by gas chromatography (CG-2010 Plus - Shimadzu, auto injetor AOC 20i) using an SP-2560 capillary column (100 m × 0,25 mm of diameter and 0,02 mm of thickness, Supelco, Bellefonte, PA). The statistical analyses were conducted using SAS version 9.1.2 (SAS Institute Inc., Cary, NC, USA). Data was analyzed as a completely randomized design with a 2 × 3 factorial arrangement, using the MIXED procedure. The model included the fixed effect of additive, NDFf level and Addit*NDFf interaction. Significance was declared at $P \leq 0.05$.

III. RESULTS AND DISCUSSION

There was a tendency of Addit*NDFf interaction ($P = 0.06$) for monounsaturated fatty acids (Table 1), where the higher MUFA value was observed for FO at 6 % of NDFf in the diet (44.86%).The functional oils decreased by 28 % the Omega 3 compared to MON ($P = 0.06$), but no other differences was observed for additive, NDFf and Addit*NDFf interaction in fatty acids profile. There was some data reporting the effect of FO in ruminal environment, changing the fermentation patterns and consequently can change the biohidrogenation of FA from the diet [3]. This process can lead to changes on beef lipid composition. However, there is a few data reporting the effect of castor oil and cashew nut shell liquid on fatty acids profile. Santos [4] fed beef cattle with FO vs monensin and monensin plus virginamycin, and founded a tendency for lower heptadecenoic acid (17:1) with FO treatment compared to monensin plus virginiamicin. However, no other changes on fatty acid profile were reported by these authors [4].

Table 1.Effect of feed additives and NDFf levels on fatty acid composition (%) of longissimus muscle fatty acid profile from Nellore bulls.

Fatty Acid	Additive		% of NDFf			SEM	*P* value		
	MON	FO	6	9	15		ADIT	NDF	ADIT*NDF
Σ SFA	47.2	47.9	46.1	47.7	48.8	0.89	0.50	0.12	0.17
Σ MUFAs	38.2	41.7	39.4	40.4	39.9	1.10	0.03	0.89	0.06
Σ PUFA	9.90	7.50	9.55	8.84	7.70	1.31	0.18	0.68	0.61
Σ PUFA: Σ SFA	0.21	0.16	0.21	0.17	0.16	0.03	0.18	0.61	0.68
Σ Omega 3	2.59	1.87	2.58	2.16	1.95	0.27	0.06	0.34	0.22
Σ Omega 6	7.49	5.87	7.09	6.89	6.06	1.10	0.22	0.74	0.71
Σ Omega6: Σ Omega3	2.89	3.14	2.75	3.19	3.11	0.22	0.40	0.43	0.35
CLA c 9, t 11	0.29	0.26	0.31	0.29	0.23	0.03	0.51	0.24	0.65

IV. CONCLUSION

The functional oils, a blend of castor oil and cashew nut shell liquid, decreased omega-3 and when associated with 6% NDFf in the diet there was an increase in MUFA.

ACKNOWLEDGEMENTS

The authors would like to thanks the Animal Science Institute (Sertãozinho. SP. Brazil) and FAPESP by financial support (project 2014/15150-0 and project 2013/21695-7).

REFERENCES

1. Folch, J.; Lees, M.; Sloane-Stanley, G. H. A Simple method for the isolation and purification of total lipides from animal tissues. The Journal of Biological Chemistry, Baltimore, v. 226, p. 497-509, 1957.
2. Kramer, J. K. G.; Fellner, V.; Dugan, M. E. R. 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, Heidelberg, v. 32, p. 1219-1228, 1997.
3. Smedes, F.; Thomasen, T.K. Evaluation of the bligh and dyer lipid determination method. Marine Pollution Bulletin, v.32, n.8/9, p.681-688, 1996.
4. Nagabhushana. K. S., Shobha. S. V. & Ravindranath. B. (1995). Selective ionophoric properties of anacardic acid. Journal of Natural Products 58: 807-810.