Diets and genetic groups effects on the muscle composition and fatty acid profiles of heifers fattened in feedlot

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ABSTRACT. This experiment evaluated the effects of four experimental diets on muscle composition and fatty acid profiles, using muscle samples of 28 Longissimus dorsi heifers. The diets evaluated were: i) corn and soybean meal (Corn); ii) cassava hulls and soybean meal (Chu); iii) cassava meal and soybean meal (Cme); iv) cassava root and soybean meal (Cro). The moisture, ash, proteins and fat muscle contents ranged from 73.95% to 76.26%, 0.97% to 1.10%, 21.37% to 23.90% and 0.75% to 1.28%, respectively. Most of the fatty acids were monounsaturated and ranged from 49.02% to 53.59%. The saturated fatty acids ranged from 42.42% to 45.34%. The polyunsaturated fatty acids were the smallest amounts, with levels between 3.18% and 4.02%. The n6/n3 ratio ranged from 7.18 to 10.17. Cassava has low price in Brazil, when compared to corn; therefore, we suggest to the producers that the use of cassava and its industrial residues in bovine's diet may represent significant savings.

Key words: cassava, fatty acids, heifers, genetic groups, meat nutritive value.

RESUMO. Efeitos de dieta e grupos genéticos sobre a composição muscular e o perfil de ácidos graxos em novilhas. Foram avaliados os efeitos de quatro dietas experimentais sobre a composição e o perfil de ácidos graxos do músculo *Longissimus dorsi* de 28 novilhas. As dietas avaliadas foram: i) milho e farelo de soja (Corn); ii) Casca de mandioca e farelo de soja (Chu); iii) farelo de mandioca e farelo de soja (Cme); iv) Raiz de mandioca e farelo de soja (Cro). Os teores de umidade, cinzas, proteína e gordura variaram de 73,95% a 76,26%, 0,97% a 1,10%, 21,37% a 23,90% e 0,75% a 1,28%, respectivamente. Ácidos graxos monoinsaturados se apresentaram em maiores concentrações, variando de 49,09% a 53,59%. Os ácidos graxos saturados variaram de 42,42% a 45,34%. Os ácidos graxos poliinsaturados se apresentaram em quantidades menores variando de 3,18% a 4,02%. As razões n6/n3 variaram de 7,18 a 10,17. No Brasil, a mandioca tem baixo preço quando comparado ao preço do milho, sugere-se aos produtores que o uso da mandioca e seus resíduos industriais na dieta de bovinos representará poupanças significantes.

Palavras-chave: mandioca, ácidos graxos , novilhas, grupos genéticos, valor nutritivo da carne.

Introduction

The consumption of bovine meat provides high-quality protein, related to essential amino acids and minerals. However, its saturated fatty acids and cholesterol contents have led to a negative image of bovine meat. (Rule *et al.,* 1997). Despite the fact that bovine meat shows cholesterol levels lower or similar to other meat sources (Feeley *et al.,* 1972), the damaging effect on total plasmatic cholesterol levels and LDL are related to the fat fraction of the meat and not to the thin meat (O'dea *et al.,* 1990). Red meat, however, has achieved the worst reputation when the subject is a healthy diet for human beings (Aharoni *et al.,* 1995).

The fat in bovine meat is a significant source of fatty acids in a diet (Mills *et al.,* 1992). However, one of the main saturated fatty acids in bovine meat, the stearic acid, has not shown increasing plasmatic cholesterol as the other acids have done (Bonanome and Grundy, 1998). Because of this varied effect of saturated fatty acids on plasmatic cholesterol, it is important to include fatty acids analysis in evaluations of meat composition (Mills *et al.,* 1992). Bovine fat is typically rich in saturated fatty acids, particularly palmitic acid, which is considered a hypercholesterolemic factor, whereas certain unsaturated fatty acids are considered to show antiatherogenic or even anticarcinogenic properties in humans (Decker and Shanta, 1992). In the same reports, stearic acid is classified as neutral.

Strategic feeding could provide a certain, but quite limited, opportunity to improve the fat nutritional value, by altering its composition (Kreuzer *et al.,* 1995; Enser *et al.,* 1997; Eweedad *et al.,* 1997). During the last few years, the feedlot systems of bovines has become an important practice because producers look forward to the benefits of the best-priced crops. This makes the ranchers look for alternative feeding potions that might make feedlot a more profitable practice. Feeding is a component that presents variable cost, which interferes a lot with the profitability. During the past decades, the production of bovine meat suffered alterations in the crossing practices among different races and in feeding. This occurred to increase muscular mass and to decrease the body fat. The bovine cattle reaches its ideal weight of commercialization before the lipids deposits are excessive; they possess 6% less fatty tissue than their ancestors of 1920 (Sweeten *et al.,* 1990).

Every year mankind becomes more sedentary, which demands a drastic change of food habits. Therefore, the increase in the demand for products with low cholesterol and fat contents, preferably with unsaturated fatty acids.

The aim of this study was to determine the composition and fatty acid profiles of the Longissimus dorsi muscle of heifers finished in feedlot. These heifers were crossbreeds of Aberdeen Angus and Nelore breeds and of Simental and Nelore breeds, receiving four different diets.

Material and methods

Animals and diets. The feedlot of the cattle was carried out in the Beef Cattle Section of Iguatemi Experimental Farm, which is part of *Universidade Estadual de Maringá*. Twenty-four crossbred heifers were used, 12 of them crossbreeds of Aberdeen Angus and Nelore breeds and 12 of Simental and Nelore breeds, with average weight around 365kg and approximately 24 months of age. Four experimental diets were evaluated: i) corn and soybean meal (Corn); ii) cassava hulls and soybean meal (Chu); iii) cassava meal and soybean meal (Cme); iv) cassava root and soybean meal (Cro). Adding corn to the cassava hull meal was necessary, because of its low energy content. Cassava hull is the byproduct of a previous cleaning of the roots that go to the industries. It is made up of stump, root butt, hull and bast tissue. Cassava meal is a residue of the cassava industry, made up of flour that is not appropriate for human consumption, fiber and residues from the industrial cleaning. Cassava scrapings are made of the whole cassava, in other words, its pulp and hull, chopped, sun-dried and ground.

Sampling. After the *rigor mortis* establishment, a 20-cm-thick section of the Longissimus dorsi muscle, which corresponds to the 11th to 12th rib section, was removed from the left side of each carcass; and after the fat was removed, all samples were stored in a freezer at -18°C, for subsequent chemical analysis. The frozen tissue samples were thawed and homogenized before chemical analysis. All samples were analyzed in triplicate.

Muscle composition. The moisture, ash and protein contents were determined as described by Cunniff (1998). Lipids were extracted from the muscle tissues using the modified Folch *et al*. (1957) method. Meat samples (15.00±0.01g) were homogenized with 90mL of chloroform-methanol (2:1 v/v) solution for 2 minutes. After blending, 30mL of chloroform and 30mL of deionized water were added and the mixture was once more homogenized. A 0.58% aqueous NaCl solution was added to the homogenate, causing the chloroform layer (containing lipid) to separate from the methanol-water phase. The lipid extract was transferred to a 250-mL flask and the solvent evaporated under a nitrogen flux. The lipid content was gravimetrically determined.

Transesterification and fatty acid composition. Methyl esters were prepared by transmethylation according to the procedure of the ISO (1978), using KOH 2mol.L^{-1} in methanol and n-heptane. Fatty acid methyl esters (FAME) were analyzed using a Shimadzu 14A (Japan) gas chromatograph equipped with a flame ionization detector and a fused silica capillary column (50m x 0.25mm and 0.20μm of Carbowax 20M). The column temperature was programmed at 7 °C min^{-1} from 150-240°C. The injection port and detector were maintained at 220°C and 245°C, respectively. The carrier gas was hydrogen (1.2mL.min-1) and the makeup gas was nitrogen (30mL.min^{-1}). The split used was 1/100. The identification of normal fatty acids was made by comparing the relative retention times of FAME peaks from samples with standards from Sigma (USA). Identification of the branched-chain fatty acids was performed in a Shimadzu 14A (Japan) gas chromatograph coupled to a mass spectrometer Shimadzu QP2000A (Japan), operating with an ionization energy of 70 eV. The separation of FAME was carried out in a fused silica capillary column (50m, 0.25mm i.d.) coated with Carbowax

20M (film thickness 0.20mm) using the program: 150 to 240°C, 5°C min^{-1}. Helium was used as carrier gas (0.7ml min^{-1}). The peak areas were determined by the CG-300 computing integrater (CG Instruments, Brazil). Data were calculated as normalized area percentages of fatty acids.

Statistical analysis. The experimental data are shown as mean ± standard deviations and muscle composition, fatty acid composition were compared using one-way analysis of variance (ANOVA). Data were processed using Statistica 4.3 software (1996).

Results and discussion

The chemical composition and fatty acid profiles of the experimental diets are shown in Tables 1 and 2, respectively. The moisture, ash, protein and fat muscle contents are shown in Table 3. According to these contents, it is possible to observe that the Aberdeen Angus and Nelore breeds presented differences ($p<0.05$) of moisture, ash, protein and fat muscle contents between diets evaluated, with contents ranging from 73.95% to 75.74%, 0.99% to 1.16%, 22.28% to 23.90% and 0.75% to 1.60%, respectively. For the Simental and Nelore crossbreeds, differences ($p>0.05$) of moisture contents (75.11% to 76.26%) between diets evaluated were not found. Ash, protein and fat presented differences ($p<0.05$) between diets evaluated with contents ranging from 0.97% to 1.10%, 21.37% to 22.68% and 0.82% to 1.28%, respectively.

Table 1. Chemical composition of experimental diets[1].

	DIETS			
	Corn2	Cro3	Chu4	Cme5
Dry matter (DM) (%)	47.90	51.50	51.10	51.70
Ash (% of DM)	4.00	2.60	6.50	3.70
Fat (% of DM)	2.45	1.65	2.74	1.50
Crude protein (% of DM)	12.10	11.30	11.80	11.50
Metabolizable energy (Mcal/kg)	4.30	4.20	4.20	4.20
NDF6 (% of DM)	31.80	31.20	38.60	28.30
ADF7 (% of DM)	18.20	18.70	21.90	16.40
Starch (% of DM)	43.50	49.60	39.30	46.40

[1]Average of three analyses. [2]Corn diet. [3]Cassava root diet. [4]Cassava hull and corn diet. [5]Cassava meal diet. [6]Neutral Detergent Fiber. [7]Acid Detergent Fiber.

In Silva *et al.* (2002), about bovine meat of Limousin vs. Nelore and Simmental vs. Nelore breeds, we concluded that those breeds have lower moisture (74.70% and 74.90%) and fat (1.37% and 1.65%) contents, and higher protein (23.18% and 22.70%), respectively. These results were obtained as an average of the four different diets. Silva *et al.* (2001) performed researches on the breed ½ Nelore vs. ½ Red Angus and obtained the following results: moisture: 73%, protein: 20% and fat: 4%.

The values found for the protein content were similar to the ones found by Koevering *et al.* (1995). The values of crude protein content were similar to the one found for ostrich meat (22.2%) and were higher than the ones found for turkey (20.4%) (Paleari *et al.,* 1998). The values found were higher then the one found for lamb meat, varying from 19.28% to 19.39% for feedlot and pasture (Rowe *et al.,* 1999). The values found for the fat content are close to the ones found for the ostrich meat (1.60%).

Table 2. Fatty acid profile of experimental diets[1].

FATTY ACIDS	DIETS			
	Corn2	Cro3	Chu4	Cme5
C12:0	0.21±0.02	0.30±0.02	0.18±0.03	0.11±0.01
C14:0	0.29±0.01	0.41±0.03	0.27±0.03	0.19±0.02
C16:0	11.50±0.07	14.65±0.85	11.72±0.21	14.97±1.06
C16:1n-7	0.10±0.00	0.12±0.01	0.09±0.00	0.06±0.00
C17:0	0.23±0.02	0.30±0.00	0.23±0.02	0.20±0.02
C18:0	2.57±0.02	3.10±0.06	2.76±0.10	2.56±0.39
C18:1n-9	25.11±0.45	23.27±0.63	24.70±0.14	24.36±2.77
C18:1n-7	0.21±0.02	0.53±0.05	ND	ND
C18:2n-6	38.56±0.32	35.60±1.80	37.84±0.21	40.51±1.45
C18:3n-6	5.99±0.21	8.54±0.36	6.65±0.41	7.55±0.05
C18:3n-3	0.84±0.16	1.17±0.35	1.73±0.16	1.80±0.35
C20:0	2.36±0.20	2.70±0.36	2.36±0.10	1.88±0.22
C20:1n-9	1.02±0.13	1.48±0.32	1.08±0.10	1.20±0.14
C20:3n-6	2.20±0.07	2.94±0.04	2.43±0.38	ND
C22:0	1.50±0.22	1.32±0.21	2.08±0.30	1.01±0.15
C22:2n-6	2.00±0.28	0.93±0.09	0.89±0.12	0.94±0.05
C23:0	0,28a±0.08	0,31a±0.02	0.20a±0.00	0.21a±0.00
C24:0	1.15±0.20	0.79±0.06	1.14±0.14	ND
C22:6n-3	0.96±0.04	0.99±0.05	1.19±0.17	ND
C24:1n-9	1.38±0.15	0.56±0.04	1.35±0.15	ND
SFA6	21.62±0.57	23.88±2.12	22.06±0.91	21.86±1.86
MUFA7	27.82±0.57	25.96±1.29	27.22±0.58	28.29±2.84
PUFA8	50.56±0.55	50.16±2.12	50.71±0.79	49.86±2.84
PUFA/SFA9	2.34	2.10	2.30	2.28
n-6/n-310	27.03	25.76	16.39	26.68

[1]Values are means ± S.D. of three samples in triplicates in each group. [2]Corn diet. [3]Cassava root diet. [4]Cassava hull and corn diet. [5]Cassava meal diet. [6]Saturated, [7]monounsaturated, [8]polyunsaturated fatty acids. [9]Ratio of polyunsaturated to saturated fatty acids. [10]Ratio of n-6 to n-3 fatty acids. ND=no detected.

Table 3. Diet effects on the Longissimus dorsi muscle composition of crossbreeds heifers (Aberdeen Angus and Nelore breeds; Simental and Nelore breeds)[1].

Crossbreeds	Aberdeen Angus x Nelore					Simental x Nelore				
Diets	Corn2	Cro3	Chu4	Cme5	Mean	Corn2	Cro3	Chu4	Cme5	Mean
Water (%)	74.30a±0.26	74.04a±0.17	75.74b±0.28	73.95a±0.57	72.59A±0.94	75.60a±0.33	75.60a±0.24	76.26a±0.14	75.11a±0.10	73.60B±0.94
Ash (%)	1.16b±0.03	1.01a±0.01	0.99a±0.02	0.99a±0.02	1.05A±0.09	1.04a±0.02	0.98b±0.04	1.10a±0.01	0.97b±0.02	1.00B±0.08
Protein (%)	23.26a±0.32	23.34a±0.25	22.28b±017	23.90a±0.77	22.64A±1.11	22.09ab±0.48	22.60a±0.24	21.37b±0.43	22.68a±0.24	21.47B±1.31
Fat (%)	1.28a±0.11	1.60a±0.03	0.98b±0.04	0.75b±0.05	1.19A±0.56	1.27a±0.09	0.82b±0.07	1.28a±0.07	1.24a±0.08	1.24A±0.81

[1]Values are means ± S.D. of three samples in triplicates in each group. Means within a row no common lowercase letters are different ($p<0.05$) between diets evaluated by Tukey test. . Means within a row no common uppercase letters are different ($p<0.05$) between genetic groups evaluated by Tukey test. [2]Corn diet; [3]Cassava root diet; [4]Cassava hull and corn diet; [5]Cassava meal diet.

A comparison of the crossbreeds evaluated indicates that differences ($p<0.05$) were observed, except for the lipid content. The moisture, ash and protein contents were lower for the Simental vs Nelore than the values found for Aberdeen Angus vs Nelore.

Tables 4 and 5 show that a great amount of fatty acids was identified (twenty-nine). Around 80% of these fatty acids have concentrations lower than 1%. The acids that were found in higher concentrations among the two genetic groups were, in order of concentration, the oleic acid (C18:1n-9): 40%, the palmitic acid (C16:0): 25% and the estearic acid: 15%. These acids constitute around 80% of the detected acids.

Most of the identified fatty acids were monounsaturated. The oleic acid (C18:1ω9) was the one present in higher percentage, with values between 41.21%, for Simental and Nelore (Corn) and 47.56%, for Aberdeen Angus and Nelore (Chu) breeds. After these ones, the acids which were identified in a larger amount were the saturated fatty acids. The palmitic acid (C16:0) was the one found

Table 4. Diet effects on the fatty acid (g/100 g of fatty acid methyl esters). profile of *Longissimus dorsi* muscle of crossbreeds of the Aberdeen Angus and Nelore breeds[1].

FATTY ACIDS	DIETS			
	Corn2	Cro3	Chu4	Cme5
C12:0	0.08a±0.01	0.05a±0.00	ND	0.08a±0.00
C14:0	2.84a±0.02	2.36b±0.02	2.09b±0.04	2.60ab±0.12
C14:1n-5	0.73a±0,01	0.53bc±0.01	0.41b±0.01	0.57c±0.03
12Me-C14:0	0.12a±0.01	0.13a±0.01	0.13a±0.01	0.14a±0.01
13Me-C14:0	0.13a±0.01	0.12a±0.01	0.12a±0.01	0.15a±0.01
C15:0	0.28a±0.01	0.28a±0.01	0.30a±0.01	0.40b±0.01
C15:1n-10	0.15a±0.01	0.14a±0.01	0.12a±0.01	0.14a±0.01
C16:0	27.00a±0.10	24.58b±0.09	24.18b±0.12	25.17ab±0.79
C16:1n-9	0.16a±0.01	0.16a±0.01	0.17a±0.01	0.17a±0.01
C16:1n-7	3.60a±0.02	3.28a±0.01	3.41a±0.03	3.28a±0.13
14Me-C16:0	0.32a±0.01	0.32a±0.01	0.33a±0.01	0.35a±0.01
15Me-C16:0	0.41a±0.01	0.43a,b±0.01	0.47b±0.02	0.46b±0.01
C17:0	0.77a±0.06	0.80a±0.01	0.91a±0.02	1.10a±0.01
C17:1n-7	0.60a±0.01	0.70ab±0.01	0.85a,b±0.01	0.94b±0.02
C17:1n-9	0.14a±0.01	0.14a±0.01	0.13a±0.01	0.14a±0.01
C18:0	13.34a±0.16	13.84a±0.17	13.71a±0.20	13.90a±0.31
C18:1n-9	44.47a,b±0.33	46.18ab±0.32	47.56a±0.39	42.78b±1.28
C18:1n-7	0.48a±0.03	0.36a±0.01	0.34a±0.07	0.47a±0.10
C18:2n-6	1.64ab±0.05	1.91a,b±0.04	1.47a±0.05	2.07b±0.06
C18:3n-6	0.26a±0.03	0.25a±0.04	0.38a±0.04	0.34a±0.09
C18:3n-3	0.39a±0.02	0.42a±0.04	0.40a±0.03	0.36a±0.03
C20:0	0.21a±0.02	0.27a±0.05	0.24a±0.04	0.26a±0.00
C20:1n-9	0.34a±0.03	0.53b±0.02	0.61b±0.05	0.53b±0.00
C20:2n-6	0.14a±0.01	0.18a±0.03	0.18a±0.06	0.17a±0.00
C20:3n-6	0.27a±0.01	0.36a±0.07	0.27a±0.03	0.32a±0.02
C20:4n-6	0.49a±0.02	0.68a±0.07	0.70a±0.06	0.77a±0.07
C22:0	0.27a±0.01	0.59b±0.02	0.33ab±0.04	0.36ab±0.02
C23:0	0.28a±0.08	0.31a±0.02	0.20a±0.00	0.21a±0.00
C24:0	0.28a±0.05	0.39a±0.03	0.47a±0.05	0.56a±0.15
OTHERS	0.98±0.07	1.01±0.09	1.05±0.15	1.09±0.07
SFA6	45.34a±0.22	43.47b,c±0.20	42.42b±0.25	44.65ac±0.87
MUFA7	50.67a,c±0.37	52.02a,b±0.35	53.59b±0.46	49.02c±1.29
PUFA8	3.18a±0.16	3.81b,c±0.28	3.40ab±0.27	4.02c±0.29
PUFA/SFA9	0.07	0.09	0.08	0.09
n-6/n-310	7.18	8.01	7.41	10.17

Values are means ± S.D. of three samples in triplicates in each group. Means within a row no common letters are different ($P<0.05$) by Tukey test. 2Corn diet. 3Cassava root diet. 4 Cassava hull and corn diet. 5Cassava meal diet. 6Saturated, 7monounsaturated, 8polyunsaturated fatty acids. 9Ratio of polyunsaturated to saturated fatty acids. 10Ratio of n-6 to n-3 fatty acids. ND = No detected.

Table 5. Diets effects on the fatty acid (g/100g of fatty acid methylesters) profile Longissimus dorsi muscle of crossbreeds of the Simental and Nelore breeds[1].

FATTY ACIDS	DIETS			
	Corn2	Cro3	Chu4	Cme5
C12:0	0.07a±0.01	0.06a±0.01	0.07a±0.00	0.06a±0.01
C14:0	2.91a±0.04	2.13b±0.03	2.37b±0.01	2.36b±0.01
C14:1ϖ5	0.75a±0.05	0.57a±0.01	0.66a±0.01	0.62a±0.01
12Me-C14:0	0.20a±0.01	0.16b±0.01	0.15b±0.01	0.16b±0.01
13Me-C14:0	0.21a±0.01	0.15b±0.01	0.15b±0.01	0.15b±0.01
C15:0	0.41a±0.02	0.33ab±0.01	0.29b±0.01	0.35ab±0.01
C15:1ϖ10	0.20a±0.01	0.17a±0.01	0.18a±0.01	0.16a±0.01
C16:0	26.30a.c±0.15	24.36b±0.22	26.95a±0.12	25.82c±0.07
C16:1ϖ9	0.20a±0.01	0.21a±0.01	0.17b±0.01	0.18ab±0.01
C16:1ϖ7	3.39a±0.15	3.38a±0.07	3.68a±0.06	3.57a±0.03
14Me-C16:0	0.41a±0.01	0.37a±0.01	0.33a±0.01	0.38a±0.01
15Me-C16:0	0.56a±0.01	0.51a±0.01	0.45a±0.01	0.50a±0.01
C17:0	0.92a±0.02	0.81a±0.02	0.69b±0.01	0.95a±0.01
C17:1ϖ7	0.67a.b±0.02	0.75a±0.03	0.58b±0.01	0.80a±0.01
C17:1ϖ9	0.16a±0.01	0.17a±0.01	0.15a±0.01	0.15a±0.01
C18:0	15.63a±0.38	13.40b±0.30	13.44b±0.14	13.37b±0.50
C18:1ϖ9	41.21a±0.29	45.47b±0.41	43.11ab±0.21	43.99bc±0.49
C18:1ϖ7	0.47ab±0.04	0.43ab±0.04	0.38a±0.02	0.53b±0.02
C18:2ϖ6	1.98a±0.08	1.87a±0.07	1.94a±0.07	1.95a±0.04
C18:3ϖ6	0.39a±0.02	0.40a±0.03	0.45a±0.03	0.37a±0.02
C18:3ϖ3	0.49a.b±0.02	0.60a±0.03	0.42b±0.02	0.50ab±0.01
C20:0	0.23a±0.02	0.34a±0.05	0.26a±0.04	0.24a±0.02
C20:1ϖ9	0.36a±0.02	0.74b±0.07	0.59ab±0.59	0.54b±0.03
C20:2ϖ6	0.27ab±0.04	0.33a±0.01	0.20b±0.03	0.31a±0.03
C20:3ϖ6	0.31a±0.02	0.45a±0.05	0.32a±0.32	0.33a±0.04
C20:4ϖ6	0.58a±0.04	0.51a±0.06	0.78a±0.06	0.78a±0.07
C22:0	0.28a±0.02	0.40a±0.04	0.40a±0.05	0.43a±0.04
C23:0	0.27a±0.03	0.52b±0.11	0.26a±0.04	0.36ab±0.04
C24:0	0.30a±0.03	0.42a±0.04	0.48a±0.04	0.43a±0.03
OTHERS	1.37±0.08	1.19±0.11	1.08±0.10	1.18±0.12
SFAf	47.31a±0.42	42.78b±0.38	45.22c±0.20	44.37c±0.51
MUFAf	47.42a±0.37	51.91b±0.49	49.49c±0.33	50.53c±0.52
PUFAf	4.02a±0.22	4.17a±0.27	4.10a±0.26	4.24a±0.26
P/Sg	0.08	0.10	0.09	0.10
ω6/ω3h	7.27	5.89	8.80	7.56

[1]Values are means ± S.D. of three samples in triplicates in each group.. Means within a row no common letters are different ($P<0.05$) by Tukey test. [2]Corn diet. [3]Cassava root diet. [4]Cassava hull and corn diet. [5]Cassava meal diet. [6]Saturated, [7]monounsaturated, [8]polyunsaturated fatty acids. [9]Ratio of polyunsaturated to saturated fatty acids. [10]Ratio of n-6 to n-3 fatty acids.

in the largest amount, with content between 24.18% (Chu) and 27.00% (Corn) for Aberdeen Angus and Nelore. The estearic acid (C18:0) was found in amount above 13.00%, the linoleic acid (C18:2n-6) above 1% and miristic acid (C14:0) above 2% in all the samples.

Fatty acids with branched methylene groups, such as: anteisopentadecílico (12Me-C14:0), isopentadecílico (13Me-C14:0), anteisomargárico (14Me-C16:0) and isomargárico (15Me-C16:0) were found in considerable amount in all samples. These fatty acids are typical of ruminants.

When comparing ovine, bovine and swine, it is possible to observe that swine have higher polyunsaturated fatty acids (PUFA) than ovine and bovine, which are ruminants (Enser *et al.,* 1996). This is probably due to the fatty acid biohidrogenation, which is caused by bacteria during Ruminant Digestion, where the final product is estearic acid.

Analyzing the fatty acids about their saturation, meat samples of Aberdeen Angus and Nelore heifers, fed with Chu ration have larger MUFA amount, 53.59%. Meat samples of Simental and Nelore heifers, fed with Corn ration have larger SFA amount, 47.31%. Meat samples of Simental and Nelore heifers presented higher PUFA (4.2%) than Aberdeen Angus and Nelore heifers (3.5%). Enser *et al.* (1996) found 3.2% for PUFA in english beef and Badiani *et al.* (2002) found 4.80%, 5.32% and 7.20% for M. Infraspinatus, M. Longissimus and M. Semitendinosus, respectively.

The highest polyunsaturated/saturated fatty acid ratio was of 0.10 -Aberdeen Angus and Nelore heifers (Cro) and the lowest was of 0.07 - Simental and Nelore heifers (Cme). Badiani *et al.* (2002) found 0.11, 0.12 and 0.16 for *M. infraspinatus, M. Longissimus and M. Semitendinosus*, respectively. Values higher than 0.45 are recommended by the Health Department (1994). Considering cardiovascular diseases, a decrease of this value indicates not very healthy foods.

When comparing the n-6/n-3 ratio to the recommended value of 4.0 (Badiani *et al.,* 2002), it is observed that the values varied between 5.89 for Simental and Nelore heifers (Cro) and 10.17 for Aberdeen Angus and Nelore heifers (Cme).

The meat fatty acid content and muscle composition were not greatly influenced by the diet. In Brazil, as cassava has low price when compared to corn, we can suggest to the producers that the use of cassava and its industrial residues in bovine's diet may represent significant savings.

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