Indices of atherogenicity and thrombogenicity in milk fat from Buffaloes raised under different feeding systems

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Abstract

This study aimed to evaluate the effect of different feeding systems on milk fat quality of Murrah buffaloes. Forty Murrah buffaloes from 5 different Brazilian farms (n=8 animals/farm) were used. Milk samples were collected monthly throughout a single lactation, and fatty acid profile was determined by gas chromatography. Milk fatty acid profile was used to calculate the nutritional quality of milk fat according to the following indices: atherogenicity index (AI); thrombogenicity index (TI); omega 6/omega 3 (n6/n3) ratio and desirable fatty acids (DFA). Statistical analyses were performed using PROC Univariete from [7]. The smallest AI (1.49±0.43) was observed in milk fat from Buffaloes raised in the Farm 3. No differences among farms were observed for TI and n6/n3 ratio. However, DFA differed among farms, with milk fat of Buffaloes from Farm 3 showing the highest values (47.17%). Our results showed that nutritional quality of milk fat from Murrah Buffaloes is influenced by different feeding systems.

Key words: **milk fatty acids, atherosclerosis, human health, Buffaloes, nutrition**

INTRODUCTION

Due to health concerns, much attention has been focused on milk fat composition. The index of atherogenicity (AI) basically describes the ratio between pro and anti-atherogenic fatty acids[1]. In milk and dairy products, the value found is around 2 however AI=1,5 is considered low and 2,5 is high [2]. The index of thrombogenicity (IT) considers the major saturated fatty acids as pro-thrombogenic, while the unsaturated ones are considered anti-thrombogenic[1]. Another index used in nutritional assessment of fats and oils is the n6/n3 ratio. According to [3] this ratio must be £ 4.0. The objective of this work was to evaluate the AI, TI, n6/n3 ratio and desirable fatty acids (DFA) in milk fat from Buffaloes raised under different feeding systems.

MATERIAL AND METHODS

This trial was carried out on five commercial farms located at Sarapui (23°38'28" S and 47°49'38" W) and Pilar do Sul (23°48'44" S and 47°42'29" W) cities, state of São Paulo, Brazil. In each farm, milk samples from eight buffaloes were collected from April to November 2002. Milk samples were stored at -20° until analyzed for fatty acid composition. The nutritional management adopted in each farm was as follow: Farm 1- buffaloes were maintained in feedlot and fed corn silage and wet brewers grain as the main sources of forage and concentrate, respectively; Farm 2 - buffaloes were maintained in feedlot and fed

*corn silage, either chopped fresh grass (*Pennisetum purpureum*) or sugarcane (*Saccharum officinarum*), and wet brewers grain as the primary concentrate source; Farm 3- buffaloes were maintained on pasture (*Brachiaria decumbens*) supplemented with sugarcane and wet brewers grain as the primary concentrate source, Farm 4- buffaloes were maintained on pasture (*Brachiaria decumbens*) supplemented with corn silage and wet brewers grain only in April, October and November; Farm 5- buffaloes were maintained on pasture (*Brachiaria ruziziensis*) supplemented with grass silage (*B. ruziziensis*) and concentrate (whole cottonseed, citric pulp and urea) plus wet brewers grain. Milk fat from samples was extracted according to [4] and fatty acids methylation was performed as described by [5]. Fatty acids methyl esters were analyzed by gas chromatograph as described [6]. Atherogenicity index (AI) and thrombogenicity index (TI) were calculated according to [1]: AI = ((C12:0 + (4 x C14:0) + C16:0)/ÓAGMI + Ón6+ Ón3); TI = (C14:0 + C16:0 + C18:0)/{(0.5 x ÓAGMI) + (0.5 x Ó* n6 + (3 x Ó* n3) + (Ó + Ón3 + Ó* n6)}.The n6/n3 series ratio and desirable fatty acids: DFA = (unsaturated + C18:0) were also calculated from milk fatty acid profile.

RESULTS AND DISCUSSION

As shown in the Table 1, milk fat from Buffaloes raised in Farm 3 had the lowest AI (1.49±0.43, P<0.05), which is considered low according to [1]. This low AI value observed in Farm 3 was strongly influenced by reduced milk fat C14:0 levels - data not shown). Buffaloes in Farm 5 presented the second lowest milk fat AI value (2.02±0.45), which differed (P<0.05) from those observed in the other Farms. Values of DFA (%) were higher (P<0.05) in Farm 3 than in the others (47.17±7.88), which is consistent with the lowest AI observed in the same Farm. No differences among farms was observed for both IT and n6/n3 ratio. These results corroborate previous reports [6] showing that milk fatty acid composition is influenced by dietary changes. Overall, our results showed that nutritional quality of milk fat from Murrah Buffaloes is altered by different feeding systems.

Table 1 - ***Indices of atherogenicity (AI), thrombogenicity (IT), n6/n3 ratio and desirable fatty acids (DFA, %) in milk fat from Murrah Buffaloes raised under different feeding systems***

Variable	Farms				
	1	2	3	4	5
AI	2.27±0.5^{a}	2.35±0.6^{a}	1.49±0.43^{b}	2.31±0.65^{a}	2.02±0.45^{c}
TI	9.72±1.12^{a}	9.80±1.14^{a}	10.25±1.93^{a}	9.95±1.76^{a}	9.77±1.08^{a}
n6/n3	7.32±2.65^{a}	8.27±3.23^{a}	8.60±3.27^{a}	6.96±4.33^{a}	8.10±2.14^{a}
DFA (%)	39.63±5.63^{c}	40.35±5.45^{b}	47.17±7.88^{a}	38.08±6.54^{c}	42.31±4.73^{b}

Within a row, means followed by different superscript letters differ from each other at P<0.05 by Student-Newman-Keuls test.

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