

## EVIDENCE FOR AN ADULTERATION OF MILK FAT OF IMPORTED MILK POWDER VARIETIES BY ADDING NON-DAIRY FAT SOURCES

L.J.P.A.P. Jayasooriya<sup>1</sup>, S.C. Wanniarachchi<sup>2</sup>, M.S.W. de Silva<sup>3</sup>, K.M.W. Bandara<sup>2</sup>, A. Wickramanayake<sup>2</sup>, G.A. Prathapasinghe<sup>3</sup>, C.V.L Jayasinghe<sup>3</sup>, S.S. Alwis<sup>3</sup> and A. N. F. Perera<sup>3</sup>

<sup>1</sup>*Department of Basic Veterinary Sciences, Faculty of Veterinary Medicine and Animal Science, University of Peradeniya*

<sup>2</sup>*Mawbima Lanka Padanama, No. A4, Perehera Mawatha, Colombo 03*

<sup>3</sup>*Faculty of Livestock, Fisheries and Nutrition, University of Wayamba, Makandura, Gonavila*

### Introduction

The problem of adulteration of food items has become a major health hazard all over the world and efforts are continuously being made to detect and avert such malpractices. The best example is the recent melamine issue, which tarnished the global dairy food industry. One of the most possible constituents of milk that can be adulterated is butter fat content, because of its high market value. Often this valuable milk fat is replaced by low cost vegetable fats and animal fats. Our regulatory bodies are only concerned about the total fat content and obsolete quality indices such as Reichert-Meissl (R.M) and Polenske values. Nonetheless, scientific literature has pointed out the fact that these indices are not accurate enough and obsolete in detection of adulterations of milk fat (Kirk and Sawyer, 1991). The proportion of butyric acid (BA) in the fatty acid profile of milk fat is used as an indicator of authenticity of pure dairy milk fat and it is used for detecting the adulteration of milk fat by other non dairy fat sources (Molkentin and Precht, 1998).

The aim of this study was to investigate the authenticity of imported milk powder brands in Sri Lanka by measuring the proportion (%) of BA in milk fat (w/w).

### Materials and Methods

Samples of ten imported full cream dairy milk powder brands were collected from the retail dealers of the Sri Lankan market. The total fat content and BA level of milk fat was estimated using standard procedures (Kirk and Sawyer, 1991). The estimation of BA in milk fat was done by gas chromatography (GC). The initial analysis was performed at the milk quality testing laboratory of the ECLIPSE Scientific group, UK (Analysis-I). For further confirmation of the results of Analysis-I, four samples were re-analyzed at the Industrial Technology Institute (ITI), Colombo (Analysis-II). The statistical analysis of the data was performed using one sample t-test (Minitab Version 14, Minitab Inc, USA).

**Table 1. The reference values for butyric acid in milk fat and the levels of butyric acid measured in the samples tested**

Reference materials and samples	Butyric acid (g/100g)	
Reference material CRM 164 of Community Bureau of Reference (Certified butyric acid content of anhydrous milk fat), (Molkentin and Precht, 1998)	3.49 ± 0.06	
Average value of Butyric acid in full cream milk powder reported in Australian and New Zealand markets (as published in Food Standards Australia New Zealand (NUTTAB 2006 Online Version)	3.42	
Butyric acid level of pure milk fat as indicated in Pearson's Food Composition and Analysis of Foods, 9th ed.	3.2 - 4.0 (average 3.6)	
Samples tested from milk powder brands collected from Sri Lankan retail market	Analysis-I	Analysis - II
Brand 1	2.82	
Brand 2	2.82	
Brand 3	2.52	2.4
Brand 4	2.91	
Brand 5	2.49	2.4
Brand 6	2.63	
Brand 7	2.73	
Brand 8	2.88	
Brand 9	2.84	2.4
Brand 10	2.93	3.0
The mean value of samples	2.75 ± 0.05	

**Results**

The results, which are shown in table 1, reveal that the fat components of all ten full cream milk powder brands contain less than that of the certified standard value of BA, which should be contained in pure milk fat. The results of the analysis-I was further confirmed by analysis-II. According to Community Bureau of Reference, the certified BA content in its reference material of anhydrous milk fat (CRM 164) is 3.49 ± 0.06 g/100 g fat (Molkentin and Precht, 1998). Furthermore, the mean value of BA in

the spray-dried milk powder varieties in New Zealand and Australian markets is 3.42 g/100g of fat (NUTTAB 2006 Online Version). The mean of the BA values in the test samples were significantly lower (one sample t-test; P<0.0001) than that of values of Food Standards Australia New Zealand (3.42 %) and CRM 164 (3.49 %).

**Discussion**

Butyric acid, which is found exclusively in ruminant milk fat, is used as an indicator of purity of dairy

fat (Molkentin and Precht, 1998). Considering the above test results, it is apparent that the milk fat contents of all ten milk powder samples tested have been adulterated with non-dairy fat sources. The conclusion is based on comparison of the test result with reference values (Table 1). Furthermore, the outcome of the statistical analysis also clearly indicated that the mean value of test samples was significantly low when compared with reference values.

### **Conclusion**

The results of this study indicate an incidence of adulteration of milk fat of milk powder brands imported to Sri Lanka.

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