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Verification of Information of the Labeling of Dairy Products of Cartagena de Indias Supermarkets[1]

Juan Carrascal Sánchez[2], Diofanor Acevedo Correa[3], Ana María Fortich[4], Deniles de Arco Rosano[5], Piedad Montero Castillo[6]

Abstract

Introduction: Labelling is used to help people choose foods for the nutrients that benefit them most but sometimes the content expressed on the label is not correct. **Objective:** To compare the data expressed on the labels of the different brands of milk, milk powder, cream, coastal cheese and yogurt with those found in this research. **Materials and methods**: Samples were taken from local markets, label information was taken, and a bromatological analysis of each product was also performed to compare with the values given by the manufacturer on the label. **Results**: The values of the parameters declared on the labels in most of the brands analyzed were lower than the actual values found and the data from the Colombian Technical Standard (NTC) and the United States Department of Agriculture (USDA) for each product. To prevent this type of event from continuing, greater control of the companies by the control bodies is necessary. **Conclusions**: Most valuable dairy products did not comply with national and international labelling rules, as they did not declare, reduce or increase the percentages of most of the parameters on the label.

Keywords: labels, light, NTC, bromatology

1 Artículo original derivado de la investigación: "Verificación de la calidad de los alimentos lácteos bajos en calorías (light) y los alimentos homólogos no light comercializados en Cartagena, tipo leche, leche en polvo, crema de leche, queso y yogurt con respecto al etiquetado, valor energético y precio", realizado en la Universidad de Cartagena, ejecutado en el periodo de 2018-2019, financiado por los autores.

2 Químico farmacéutico, M. Sc. en Ciencias Farmacéuticas. Correo: jjcarrascals@unal.edu.co / ORCID: 0000-0003-1470-7632

3 Ingeniero de Alimentos, Ph. D. en Ingeniería de Alimentos. Docente de la Universidad de Cartagena. Grupo de Investigación en Innovación y Desarrollo Agropecuario y Agroindustrial (IDAA). Correo: diofanor3000@gmail.com / ORCID: 0000-0002-1364-7044

4 Química farmacéutica. Correo: anamfortich@gmail.com. ORCID: 0000-0001-8275-1454

5 Química farmacéutica, M.Sc. en Ciencias Ambientales. Docente de la Universidad de Cartagena. Correo: ddearcor@unicartagena.edu.co ORCID: 0000-0002-4895-7691

6 Ingeniera de Alimentos, Ph. D. en Gestión de la Innovación. Docente de la Universidad de Cartagena. Grupo de Investigación en Innovación y Desarrollo Agropecuario y Agroindustrial (IDAA). Correo: pmonteroc@unicartagena.edu.co / ORCID: 0000-0001-7148-5285

Autor para Correspondencia: Diofanor Acevedo Correa, e-mail: diofanor3000@gmail.com

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Verificación de Información del Etiquetado de los Productos Lácteos de Supermercados de Cartagena de Indias

Resumen

Introducción: El etiquetado se utiliza para ayudar a las personas a elegir los alimentos por los nutrientes que más les benefician, pero en algunas ocasiones el contenido que expresa la etiqueta no es correcto. **Objetivo:** Comparar los datos expresados en las etiquetas de las diferentes marcas de leche, leche en polvo, nata, queso costero y yogur con los que se encuentran en esta investigación. **Materiales y métodos:** Las muestras se tomaron de los mercados locales, se tomó la información de la etiqueta y también se realizó un análisis bromatológico de cada producto para comparar con los valores dados por el fabricante en la etiqueta. **Resultados:** Los valores de los parámetros declarados en las etiquetas en la mayoría de las marcas analizadas fueron inferiores a los valores reales encontrados y a los datos de la Norma Técnica Colombiana (NTC) y del Departamento de Agricultura de los Estados Unidos (USDA) para cada producto. Para evitar que este tipo de eventos continúe, es necesario un mayor control de las empresas por parte de los órganos de control. **Conclusiones:** La mayoría de los productos lácteos de valor no cumplían con las normas de etiquetado nacionales e internacionales, ya que no declaraban, reducían o aumentaban los porcentajes de la mayoría de los parámetros que figuraban en la etiqueta.

Palabras clave: etiquetas, light, NTC, bromatología

Verificação das Informações Relativas a Rotulagem dos Produtos Lácteos dos Supermercados da Cartagena de Indias

Resumo

Introdução: A rotulagem é usada para ajudar as pessoas a escolher os alimentos para os nutrientes que mais as beneficiam, mas por vezes o conteúdo expresso no rótulo não está correcto. **Objetivo**: Comparar os dados expressos nos rótulos das diferentes marcas de leite, leite em pó, creme, queijo costeiro e iogurte com os encontrados nesta pesquisa. **Materiais e métodos**: Foram colhidas amostras dos mercados locais, foram recolhidas informações do rótulo e foi realizada uma análise bromatológica de cada produto para comparação com os valores fornecidos pelo fabricante no rótulo. **Resultados**: Os valores dos parâmetros declarados nos rótulos na maioria das marcas analisadas foram inferiores aos valores reais encontrados e aos dados do Padrão Técnico Colombiano (NTC) e do Departamento de Agricultura dos Estados Unidos (USDA) para cada produto. A fim de evitar a continuação deste tipo de eventos, é necessário um maior controlo das empresas por parte dos órgãos de controlo. **Conclusões**: Os produtos lácteos mais valiosos não cumpriam as regras de rotulagem nacionais e internacionais, uma vez que não declaravam, reduziam ou aumentavam as percentagens da maioria dos parâmetros do rótulo.

Palavras-chave: Rótulos, light, NTC, bromatologia

Introduction

Nutrition labelling is focused on helping people select foods according to the nutrient content that has the most health benefits for people. Knowledge of this information coupled with an understanding of the basic principles of nutrition, plus the adoption of a healthy diet, can lead to better decisions when buying food. Nutrition information or labels on packaging form an important element of consumer protection, and consumers have the right to know the nutrient composition of the foods they buy (Cowburn & Stockley, 2005). Food labelling has become the subject of international debate among regulators, scientists, the public health community and the food industry due to the low credibility of this process (Drewnowski & Fulgoni, 2008; Roodenburg, Popkin & Seidell, 2011).

Milk is food found in the basic basket of all families, due to its nutritional value, which is seen in its components and the multiple benefits it provides (Claeys et al., 2013; Agudelo & Bedoya, 2005). Foods made from milk are a group of products formed primarily by cheese, milk cream, milk in its various presentations (whole, lactose, long life, semi-lactose, among others), yogurt and butter, in which milk is the most important component, and are characterized by being complete from a nutritional point of view, since it provides carbohydrates, proteins, lipids, vitamins and minerals (Bello et al., 2004). Research on food labelling is very limited and focuses on such things as the acceptability and effectiveness of front-of-pack food labelling systems in the Australian market (Kelly et al., 2009), other research focuses on whether consumers are aware of the information on the label of the foods they eat (Cowburn & Stockley, 2005; Mills et al., 2004; Wandel, 1997), among others. However, studies to verify that the data displayed on the label are the real ones, so it is necessary to verify whether this information submitted by manufacturers of dairy products is correct. For this reason, the objective of this investigation was to confront the information of the labeling of dairy products of the city of Cartagena de Indias.

Materials and Methods

Raw material and label data review

The population used were light dairy products and their (normal) counterparts marketed in the city of Cartagena. A total of 32 samples were taken from dairy products distributed as follows: three brands of semi-skimmed long-life milk, three brands of powdered milk, three brands of milk cream, three brands of coastal cheese and three brands of yogurt, three similar brands were chosen from each brand. The following information was recorded on the label of the samples analyzed.

Bromatological Analysis

The bromatological analyses performed on the selected dairy products were: protein (984.13), fat (929.39 C), moisture (927.05) and ash (923.03), according to AOAC (1995). The percentage of carbohydrates was calculated according to equation N° 1.

$$\%\ Carbohydrates = 100\% - (\%moisture + \%\ fat + \%\ ash + \%\ protein) \qquad \text{Equation N° 1}$$

Statistical analysis

The results were expressed as the mean with its respective standard deviation and compared using analysis of variance (ANOVA) and multiple comparison tests through the LSD test with a significance level of 5%. The statistical program Statgrapichs Centurion XVI.I was used in Windows 10.

Results

As can be seen in Table N° 1, in whole and light milks of brand A present statistically significant differences ($p \leq 0.05$) in all the parameters found in this research with respect to the declared in its label except in the percentage of carbohydrates in normal milk. On the other hand, there are statistically significant differences ($p \leq 0.05$) in the percentage of carbohydrates in both samples and percentage of fat for normal milk and percentage of protein for light whole-life milk with respect to the declared. For brand C, statistically significant differences were obtained ($p \leq 0.05$) in all parameters of the light presentation, while for the normal sample there was only a difference in the percentage of carbohydrates. It should be made clear that moisture and ash parameters are not declared on the label of these products.

Table N° 1. Nutritional information found vs. declared on the label of the whole milk and light milk sample

		Brand A		Brand B		Brand C	
		Normal	Light	Normal	Light	Normal	Light
% Moisture	D	-	-	-	-	-	-
	F	88.10±0.01	89.21±0.06	89.17±0.06	91.18±0.1	88.70±0.03	90.75±0.01
% Ash	D	-	-	-	-	-	-
	F	0.67±0.0	0.73±0.01	0.69±0.0	0.76±0.0	0.74±0.01	0.69±0.0
% Protein	D	2.7^{b}	2.6^{b}	3.1^{a}	4.8^{b}	3^{a}	3.7^{b}
	F	$3.34±0.07^{a}$	$3.57±0.08^{a}$	$3.21±0.03^{a}$	$3.69±0.03^{a}$	$3.05±0.08^{a}$	$3.87±0.07^{a}$
% Fat	D	2.9^{b}	0.0^{b}	2.9^{b}	0.0^{a}	3.1^{a}	0.2^{b}
	F	$3.11±0.1^{a}$	$0.1±0.0^{a}$	$3.304±0.0^{a}$	$0.13±0.05^{a}$	$3.06±0.05^{a}$	$0.63±0.03^{a}$
% Carbohydrates	D	4.8^{a}	4.8^{b}	4.8^{b}	4.8^{b}	5.1^{b}	5.7^{b}
	F	$4.77±0.07^{a}$	$6.38±0.14^{a}$	$3.61±0.09^{a}$	$3.91±0.06^{a}$	$4.44±0.12^{a}$	$4.04±0.09^{a}$

Note. Different letters in the same column of the same parameter indicate statistically significant difference ($p \leq 0.05$). F: Found. D: Declared.

Source: Elaborated and adapted by the authors.

For brand E and H in Table N° 2 in the normal sample there were statistically significant differences ($p \leq 0.05$), while in the same light product there was no statistically significant difference ($p > 0.05$) only in the fat parameter, these differences with respect to what was expressed by the manufacturer on the label in all parameters. In the G brand milk powder

it was found that the normal sample obtained a statistically significant difference ($p \leq 0.05$) for the percentage of fat and carbohydrates, meanwhile for the light sample only a statistically significant difference ($p \leq 0.05$) in the percentage of protein was obtained. These differences are based on manufacturers' labeling.

Table N° 2. Nutritional information found vs. declared on the label of the milk powder sample

		Brand E		Brand H		Brand G	
		Normal	Light	Normal	Light	Normal	Light
% Moisture	D	-	-	-	-	-	-
	F	3.57±0.00	3.83±0.02	3.67±0.01	3.87±0.01	6.37±0.01	3.74±0.01
% Ash	D	-	-	-	-	-	- o
	F	6.29±0.01	8.56±0.01	5.09±0.01	7.74±0.01	3.30±0.0	8.56±0.01
% Protein	D	17.5^{b}	27.7^{b}	26.1^{b}	36^{b}	25.7^{a}	32.1^{b}
	F	$17.84±0.12^{a}$	$28.08±0.09^{a}$	$27.38±0.08^{a}$	$37.66±0.12^{a}$	$25.67±0.27^{a}$	$31.83±0.16^{a}$
% Fat	D	27.7^{b}	2.1^{a}	26.9^{b}	1^{a}	28.2^{b}	1.3^{a}
	F	$27.55±0.38^{a}$	$2.33±0.33^{a}$	$25.66±0.33^{a}$	$0.77±0.19^{a}$	$26.65±1.47^{a}$	$1.345±0.05^{a}$
% Carbohydrates	D	46^{b}	60.3^{b}	37.9^{b}	50.7^{b}	37.4^{b}	48^{a}
	F	$44.72±0.48^{a}$	$57.19±0.29^{a}$	$38.19±0.26^{a}$	$49.88±0.27^{a}$	$37.99±1.36^{a}$	$48.68±0.27^{a}$

Note. Different letters in the same column of the same parameter indicate statistically significant difference ($p \leq 0.05$). F: Found. D: Declared.

Source: Elaborated and adapted by the authors.

Table N° 3 shows three samples of costeño cheese, sample I for the light sample showed statistically significant differences ($p \leq 0.05$) in all parameters, while these were not reported by the manufacturer. On the other hand, in sample J for both presentations, only in the parameters of fat and carbohydrates no statistically significant difference was found ($p > 0.05$). And finally, in J brand cheeses, a statistically significant difference was found ($p \leq 0.05$) only in protein and fat parameters for normal and light presentations, respectively.

Table N° 3. Nutritional information found vs. declared on the label of the costeño cheese sample

		Brand I		Brand J		Brand K	
		Normal	Light	Normal	Light	Normal	Light
% Moisture	D	-	-	-	-	-	-
	F	48.31±0.19	50.59±0.81	52.60±0.06	49.45±0.00	45.69±0.21	44.89±0.23

		Brand I		Brand J		Brand K	
		Normal	Light	Normal	Light	Normal	Light
% Ash	D	-	-	-	-	-	-
	F	3.30±0.00	2.85±0.02	3.47±0.00	3.27±0.00	2.79±0.01	2.75±0.01
% Protein	D	-	5^{b}	43.2^{b}	26^{b}	0^{b}	30^{a}
	F	12.80±0.69	$19.03±0.69^{a}$	$9.95±0.52^{a}$	$30.52±0.37^{a}$	$19.84±0.24^{a}$	$30.44±0.49^{a}$
% Fat	D	-	20^{b}	42^{b}	16^{a}	27.7^{a}	15^{b}
	F	30.34±1.17	$17.73±0.82^{a}$	$26.59±1.20^{a}$	$15.42±0.50^{a}$	$27.04±0.52^{a}$	$17.52±0.99^{a}$
% Carbohydrates	D	-	4^{b}	4^{b}	2^{a}	4.2^{a}	5^{a}
	F	5.23±0.45	$9.77±1.54^{a}$	$7.36±0.86^{a}$	$1.32±0.73^{a}$	$4.61±0.59^{a}$	$4.37±1.19^{a}$

Note. Different letters in the same column of the same parameter indicate statistically significant difference ($p \leq 0.05$). F: Found. D: Declared.

Source: Elaborated and adapted by the authors.

Three different brands of heavy cream were analyzed (Table N° 4), in all the samples in the parameters declared by the manufacturer, there was only a statistically significant difference ($p \leq 0.05$) in the percentage of fat of the normal sample for the brand L and M, and normal and light for the brand N.

Table N° 4. Nutritional information found vs. declared on the label of the heavy cream sample

		Marca L		Marca M		Marca N	
		Normal	Light	Normal	Light	Normal	Light
% Moisture	D	-	-	-	-	-	-
	F	64.82±0.04	73.50±0.30	69.68±0.91	74.09±0.15	67.16±0.19	74.76±0.05
% Ash	D	-	-	-	-	-	-
	F	0.12±0.00	0.68±0.00	0.36±0.002	0.1±0.001	0.7±0.005	0.62±0.00
% Protein	D	-	2.6^{a}	-	-	-	-
	F	$1.81±0.01^{a}$	$2.63±0.07^{a}$	2.56±0.11	2.94±0.09	2.26±0.13	2.47±0.07
% Fat	D	35.0^{b}	19.5^{a}	25^{b}	17.8^{a}	25^{b}	17.5^{b}
	F	$31.77±0.68^{a}$	$19.75±0.58^{a}$	$26.36±0.65^{a}$	$17.44±0.55^{a}$	$27.37±0.55^{a}$	$18.49±0.40^{a}$
% Carbohydrates	D	-	3.3^{a}	-	-	-	-
	F	1.46±0.63	$3.42±0.40^{a}$	1.02±0.14	$5.41±0.31^{b}$	2.49±0.55	3.60±0.46

Note. Different letters in the same column of the same parameter indicate statistically significant difference ($p \leq 0.05$). F: Found. D: Declared.

Source: Elaborated and adapted by the authors.

There was a statistically significant difference ($p \leq 0.05$) in the fat parameter for the brand O in its normal yogurt presentation (Table N° 5) and in the light product of the same brand there was a difference in all the declared parameters. For the P mark in its normal sample no statistically significant difference was found ($p > 0.05$) only in the percentage of protein, while in its light presentation there was no statistically significant difference in any of the parameters.

Table N° 5. Nutrition information found vs. declared on yogurt label

		Brand O		Brand P		Brand Q	
		Normal	Light	Normal	Light	Normal	Light
% Moisture	D	-	-	-	-	-	-
	F	80.23±0.01	90.09±0.05	79.87±0.38	89.88±0.05	78.68±0.008	87.56±0.004
% Ash	D	-	-	-	-	-	-
	F	0.61±0.007	0.85±0.007	0.64±0.0002	0.77±0.005	0.63±0.001	0.90±0.004
% Protein	D	3.3^{a}	4^{b}	3.1^{a}	-	3.9^{b}	6^{b}
	F	$3.10±0.03^{a}$	$3.61±0.07^{a}$	$3.05±0.05^{a}$	$4.09±0.24^{b}$	$3.06±0.12^{a}$	$4.09±0.24^{a}$
% Fat	D	1.3^{a}	0.0^{b}	3.2^{b}	0.1^{a}	2.8^{a}	0.5^{b}
	F	$1.23±0.05^{a}$	$0.13±0.05^{a}$	$3.03±0.05^{a}$	$0.01±0.02^{a}$	$2.8±0.1^{a}$	$0.26±0.05^{a}$
% Carbohydrates	D	17.3^{b}	6.0^{b}	16.5^{b}	5.1^{a}	16.1^{b}	6^{b}
	F	$14.81±0.04^{a}$	$5.30±0.07^{a}$	$13.40±0.42^{a}$	$5.23±0.21^{a}$	$14.81±0.14^{a}$	$6.90±0.27^{a}$

Note. Different letters in the same column of the same parameter indicate statistically significant difference ($p<0.05$). F: Found. D: Declared.

Source: Elaborated and adapted by the authors.

Discussion

The percentages of protein and fat in the three brands in the normal presentation of milk comply with NTC 3856, which requires this type of milk (normal and light) to have a minimum protein percentage of 2.8 and 3.0 respectively. On the other hand, the information provided by the United States Department of Agriculture (USDA) (2018) for this same product indicates that the percentage of protein (3.39) is similar to that found, It is also the case in the percentage of carbohydrates except for the light presentation of the brand A and normal and light of the brand B in the declared and found (as expressed by the USDA is 4.66 %), the percentage of fat in the normal presentation of the three brands exceeds that imposed by this entity which is 2.12 %.

The percentages found and declared of protein of the three milk powder brands were like those expressed by the USDA (26.67 %) for milk powder, except for the normal milk powder of the brand E that was lower and the light presentation of the brand H that was higher. The

percentage of fat for the three brands in their normal presentation were like those declared by the USDA (26.67 %). As far as the percentage of carbohydrates exposed by the previous entity is of 40 % being only near the normal presentation of the marks H and G. With respect to the NTC 1036, the percentage of moisture found was within what was allowed because it is maximum 4 %, except for the normal presentation of the mark G, As for the percentage of ashes, only the maximum required of 6 % of normal milk powder H and G brand, the minimum protein percentage of 33 % was only met by the light presentation of H brand.

According to NTC 750, all cheeses in their presentations are considered firm or semihard because they have a percentage of moisture without fat between 54.0–69.0. About the percentage of fat, cheeses can be grouped as fats (≥ 45 %–< 60 %), which would include the normal cheeses of the three brands, while light cheeses are considered semi-fat (≥ 25 % -< 45 %), this about the fat in dry extract in both cases.

According to the USDA for heavy cream, the moisture percentage all samples were above the stipulated by the USDA (57.71 %), the percentage of protein that is 2.84 was only like that found in the normal M brand heavy cream, the percentage of fat (36.08), only approximates the normal presentation of the L brand and in terms of the percentage of carbohydrates (2.84) the closest was the normal presentation of the N brand. As for NTC 930, for the percentage of fat for the light presentations of the three brands were within what was required (18 %–< 35 %), while the normal presentations of all brands were not within what was allowed (35 %–< 48 %).

According to the USDA for yogurt, the percentage of moisture of this entity (87.90 %) is only similar to that obtained by the yogurt light of the mark Q, the percentage of protein (3.47), was within an acceptable range of all samples, the percentage of fat (3.25), the closest was found in the normal presentation in the mark Q and the percentage of carbohydrates (4.66), the closest were the light presentations of the mark O and P. As for NTC 805, the percentage of protein was above the minimum required by the standard (2.6 %) and the percentage of fat for normal presentations only did not exceed the minimum allowed (2.5 %) Q brand.

Most of the parameters reported by producers for milk, milk powder, milk cream, costeño cheese and yogurt do not comply with national (Resolution number 005109 of 2005) and international (Codex Stan 1-1985) standards, because it does not give the actual data of the product, given that sometimes they put percentages below and sometimes above what is expressed on the label of the product. In the same way, none of the products presented the declaration of ash and moisture parameters on their labels.

Conclusion

Most of the parameters of the products evaluated (whole milk, milk powder, costeño cheese, heavy cream, and yogurt) were below those exposed by the USDA and NTC. Most valued dairy foods did not comply with national and international labelling standards, as they did not declare, reduced, or increased the percentages of most of the parameters displayed on the label.

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