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PASTILLAS DE LECHE FROM COW'S AND CARABAO'S MILK

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ABSTRACT

Pastillas de leche or milk candies were prepared by separately evaporating fresh cow's and carabao's milk and adding sugar to each until the mixture formed a soft ball.

Statistical analysis of the results of organoleptic tests did not reveal significant differences in sweetness, flavor, odor, and general acceptability of these finished products. However, differences in color, body, and texture were noted. Carabao's milk scored high in terms of all organoleptic parameters and was favored by the panel of testers.

The candies made from carabao's milk were also shown to have a higher fat and protein content than those made from cow's milk; thus, the higher yield obtained in the case of carabao's milk.

INTRODUCTION

Pastillas de leche is a confectionary specialty of South America. Its basic ingredients are milk and sugar. A stabilizer is also often added. Usually made from mucillages extracted from a wide variety of plants, stabilizers have a multitude of functional properties and are used among others as crystallization inhibitors, adhesives, viscosity modifiers, and binding and swelling agents (1).

In the Philippines, particularly in San Miguel, Bulacan, the production of *pastillas de leche* from carabao's milk has become a cottage industry. In this form, surplus carabao's milk can be preserved for a relatively long period of time. A perfect food, carabao's milk contains valuable nutrients such as fat, protein, vitamins, minerals and carbohydrates.

In candy making, these nutrients, particularly protein, are essential for the development of proper body, flavor, and color during the cooking process (2), while the lactose content of milk aids in reducing sweetness. Lactose is known to absorb riboflavin and pigments during crystallization, enabling the crystallized lactose of fudge type candies to hold various flavors and pigments longer than when these candies contain no lactose.

Traditionally, *pastillas de leche* is made by heating carabao's milk over a high flame until the mixture turns to a soft ball. In this study, *pastillas de leche* was prepared from both cow's and carabao's milk; heating was done over a low flame in order to prevent the browning reaction between the protein and the sugar contained in the mixture (3).

The popular use of carabao's milk in the production of *pastillas de leche* and white cheese derives from its characteristic opaque white color and its high total solid contents, properties which can equally apply to cow's milk. It was, therefore, the objective of this study to compare the usefulness of cow's milk as a raw material for *pastillas de leche*.

EXPERIMENTAL SECTION

Materials

Carabao's milk and cow's milk were obtained from the Dairy Training and Research Institute (DTRI) Milk Collection Scheme. These were subjected to the clot-on-boiling test (COB). The milk samples that gave

negative results were analyzed for fat, protein and moisture content before being processed into *pastillas de leche*.

Preparation of pastillas de leche

The milk samples were allowed to boil in open kettles or enamel basins. Sugar was added until it made up 20 per cent of the total mixture. The mixture was stirred regularly until two-thirds of the volume had evaporated. When the mixture started to turn into a soft ball, it was allowed to cool. The mixture was divided into smaller pieces which were individually wrapped first in bond paper and then in Japanese paper. Yield was calculated in terms of candy weight.

Analysis

Fat content was analyzed by the Gerber method, protein by the Kjeldahl method, and moisture by the Carter-Simon method. The candies were also subjected to organoleptic analyses. The Modified Score card adopted from Nelson & Trou (1964) was used (4).

The Randomized Complete Block Design (RCB) was used in statistical analyses of organoleptic test results. The Honesty Significant Differences (HSD) test was used for purposes of comparison.

RESULTS AND DISCUSSION

Proximate analysis of cow's and carabao's milk

Samples of cow's and carabao's milk were subjected to chemical analysis.

The results given in Table 1 show that cow's milk has less fat, protein, and total solids than carabao's milk. The values obtained are in agreement with those reported by Eckles (5) (fat, 3.8% and protein, 2.8 to 4.0%). As to carabao's milk, the values obtained fall

Table 1. Proximate analysis of cow's and carabao's milk.*

Milk Source	Fat (%)	Protein (%)	Moisture (%)	Total Solids (%)
cow	3.8	2.80	87.89	12.11
carabao	7.76	4.66	83.01	16.99

*Figures reported represent average values.

within the range of values obtained by other workers.

Proximate analysis of pastillas de leche

Table 2 shows that results of the chemical analysis of *pastillas de leche* from cow's and carabao's milk. It was found that the latter has a higher fat and protein content than the former, a finding that correlates well with the results of the proximate analysis of the two raw materials. The product yield from carabao's milk was also higher. These results conform with the findings reported by Dulay (6) in connection with the production of white cheese from both carabao's and cow's milk.

It was also observed that *pastillas de leche* from carabao's milk has a higher moisture content and, therefore, a correspondingly lower total solids content.

Organoleptic evaluation

Table 3 summarizes the organoleptic evaluation of the overall quality of *pastillas de leche* from cow's and carabao's milk. The color, sweetness, body, texture, flavor, and odor of the finished product were graded on a hedonic scale of 1 to 7. A hedonic scale of 1 to 5 was used to evaluate general acceptability.

Color. The *pastillas de leche* made from carabao's milk was light yellow, with a greenish tinge. Those made from cow's milk had a characteristically distinct yellow color. The mean scores for carabao's and cow's milk candies were 5.12 and 5.11, respectively; on the scale used, these values fall within the range labelled desirable to very desirable.

Sweetness. The candy products were likewise found to be similar in sweetness. On the scale used, the candies made from carabao's milk scored 5.0 (desirable) and those made from cow's milk 4.75 (between slightly desirable and desirable).

Table 2. Yield and proximate analysis of *pastillas de leche* from cow's and carabao's milk.*

Milk Source	Fat (%)	Protein (%)	Moisture (%)	Total Solids (%)	Yield	
					Weight (g)	(%)
cow	8.0	7.90	14.54	85.46	349.43	29.12
carabao	17.0	9.17	17.08	82.92	431.28	35.94

*Figures represent average values.

Table 3. Mean scores for different quality attributes of *pastillas de leche* from cow's and carabao's milk.

Milk Source	Color	Sweetness	Body & Texture	Flavor & Odor	General Acceptability
cow	5.11	4.75	3.88	4.06	3.06
carabao	5.12	5.0	4.12	4.56	3.59

Body and texture. Significant differences were observed with respect to the body and texture of the finished products, although both were soft-bodied. The candies made from carabao's milk scored 4.12 (slightly desirable) while those made from cow's milk scored 3.88 (between no strong preference and slightly desirable).

Flavor and odor. The flavor and odor of the finished products did not differ significantly. The mean score for cow's milk candies was 4.06 and for carabao's milk candies 4.56 (slightly desirable and desirable, respectively).

General acceptability. With respect to general acceptability of the finished products, candies made from carabao's milk scored 3.59 (moderately preferred) and those made from cow's milk scored 3.06 (no preference).

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