

## Effect of operation practices of raw milk in small production systems on microbiological quality in Tlaxcala, Mexico

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The aim of this study was to evaluate the effect of operation practices of raw milk in dairy small production systems, first obtained under traditional management (Phase 1) and implementing by training a sanitation technique (Phase 2) on microbiological quality in three different counties near Zahuapan river in Tlaxcala, when sanitization technique was applied in operation practices microbiological quality was improved.

**Keywords** Raw milk, sanitization, microbial quality

### 1. Introduction

The Dairy Family Production System (DFPS) is part of the Mexican dairy sector that contributes 10% on domestic production (1), DFPS are important because it provides raw material to produce dairy products in small industries or at home (2), which are distributed in local markets. Approximately 170, 000 dairy farms nationwide have an economic influence; in addition, they provide basic food and contribute to income generation (3). Moreover, this DFPS use family labor, which is an important source of employment which is characterized by small work areas of surrounding land near farms, where other animal species, fodder and crops residues are used (4). Milking is done manually and in some cases, with machines, lacking an adequate milking routine (5), with adapted and non-functional facilities (6); these characteristics become determinant in milk quality.

In practical terms, milk quality comes from the milking of healthy and well-fed cows, lacking adulterants, physical, chemical and biological contamination (7), therefore, overall quality is summarized in the fulfillment of nutritional, organoleptic and hygiene expectations. However, when unsuitable production management and transformation practices appears, these expectations are modified, due to milk nutrient richness makes it an ideal culture medium for many microorganisms (8) and therefore an excellent vehicle for human disease transmission, both zoonotic (brucellosis, tuberculosis), or those caused by pathogenic microorganisms including *Salmonella* sp., *Listeria monocytogenes* and *Escherichia coli* O157: H7 (9,10). Furthermore, there are other microorganisms (total coliforms, aerobic mesophilic bacteria, molds and yeasts, among others) that affect organoleptic and physical characteristics of the product, reducing its shelf life (11).

For DFPS, milk quality (physical, chemical, adulterating, microbiological and sanitary quality) is unattractive since not receive an additional payment for this concept, the producer priority is to sell largest milk volumes covering the minimum requirements (lipid content and acidity) from buyers, in addition, current regulations are not mandatory. Given the characteristics mentioned above, DFPS is in the public eye due its limited production of raw milk, which is mostly collected to produce cheeses that are distributed in local markets and could lead to consumer's latent risk, since the product is not subjected to any thermal process for hygienic quality assessment to ensure its safety. The implementation in DFPS for good milking practices leads to the execution of different activities that contribute to the fulfillment of the minimum hygienic milk requirements. These requirements include the provision of an adequate milking infrastructure, producers training and motivation to carry out the activities, as well as an optimal state of instruments, cleaning material and healthy animals (12).

On the other hand, Zahuapan river crosses 14 counties in Tlaxcala, Mexico, river basin irrigates 5,853 hectares. The main crops are maize and forage that are the cattle food support whose production is near 34 million of milk liters from DFPS in al Tlaxcala state (13). In this region, there are several factors that influence the production and milk, including the use of wastewater for forage production. Therefore, the aim of these chapter is to evaluate the microbiological milk quality produced in DFPS of three counties located near the Zahuapan river under traditional management and to evaluate the implementation of the pre-milking cleaning, to demonstrate that there are alternatives in management during the production process that allow to obtain milk with a higher standard of hygienic quality.

### 2. Materials and methods

#### 2.1 Sample collection