COMUNICACIONES

Contamination of bovine milk with residues of inhibitory substances in Costa Rica

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Resumen: Durante el primer semestre de 1992 un total de 200 muestras de leche de ganado vacuno, comercializadas en la provincia de San José, Costa Rica, fueron analizadas para la determinación de residuos de sustancias inhibitorias. Se analizó un número similar de muestras de leche fluida pasteurizada y no pasteurizada expendida en supermercados y por lecheros ambulantes respectivamente. Así mismo, se estudió un número análogo de muestras de leche en polvo distribuídas en Centros de Alimentación Infantil y vendida en supermercados. La mínima concentración de penicilina y sulfonamidas detectada por la prueba de inhibición del crecimiento del *Bacillus stearothermophilus* var. *calidolactis* (ATCC 10149) fue de 0.006 IU/ml y 0.1-1µg/ml respectivamente. El 9% de las muestras de leche cruda y el 2% de la pasteurizada presentaron residuos de sustancias inhibitorias; que no se detectaron en la leche en polvo. Se nota una disminución en el porcentaje de leches positivas por residuos de sustancias inhibitorias entre 1987 y 1992 en el país.

Key words: Antimicrobial agents, milk, penicillin, sulphonamides, contamination.

Milk is an important element in the dietetic balance of every individual, because of its high contents of calcium, phosphorus and easily digested proteins, although different volumes are recommended for consumption according to the age group (Zeman 1983).

Recently there has been a world wide increase in the production of milk, favoured by the use of antimicrobial agents to treat infectious diseases (particularly mastitis) in cattle. These include beta-lactam antibiotics and sulphonamides. Nevertheless, inadequate clinical use results in the contamination of milk with residues (Jones and Seymour 1988, Vautier and Postigo 1986), which poses a serious problem for public health and the dairy industry.

The presence of antimicrobial agents in milk is associated with an increase in the bacterial resistance to this kind of agents when supplied for therapeutic treatments (Vautier and Postigo 1986), asthma (Jones and Seymour 1988), dermatitis (anonymous 1963) and rarely anaphylactic shock in hypersensible individuals (Vautier and Postigo 1986).

The importance of these agents stems from their resistance to ordinary pasteurization (71.7°C/15 sec), UHT (ultra high temperature (135°C/2 sec) and deep freezing (-15 to -30°C) (Vautier and Postigo 1986, anonymous 1986).

As a reaction the European Community and the World Health Organization have established a maximum allowed concentration of penicillin G in milk used for human consumption. Some values are: Ireland 0.007µg/ml, New Zealand 0.003µg/ml, USA 0.01µg/ml (Jones and Seymour 1988), Sweden and WHO 0.006µg/ml (Carlson and Bjork 1989).

In the dairy industry, the contamination of milk with antimicrobial substances inhibits the development of starter cultures needed in the fermentation processes of derivates, causing important economical loses (Jones and Seymour 1988).

Recently, many rapid and sensitive tests to detect antimicrobial substances have been developed. The lowest detectable levels for sodium penicillin and penicillin G are 0.002 and 0.005 IU/ml respectively, and 0.01µg/ml for sulphonamides (Carlsson and Bjorck 1991).

In tropical areas there is a greater prevalence of mastitis agents, favouring a higher use of antimicrobial agents and resulting in higher residue levels. This study reports their presence in fluid and dry milk commercialized in San Jose, Costa Rica.

A total of 200 milk samples were analyzed: 50 of pasteurized fluid milk from shops and 50 of non-pasteurized sold in the street; 50 of dry milk from child care centers (Cen-Cinai) and 50 of also dry milk from shops. Sampling sites were randomly selected and five samples taken from each.

We used the inhibition test for the growth of *B. stearothermophilus* var. *calidolactis* (ATCC 10149) (Carlsson and Bjorck 1991, anonymous 1986) which has a limit of 0.006 µg/ml for penicillin and 0.1-1 µg/ml for sulphonamides. Positive samples were corroborated by one replication.

Our results indicate that 2% of the pasteurized samples and 9% of the non-pasteurized have detectable levels of penicillin or sulphonamide residues. None were found in dry milk.

In most industrialized countries, legislation is specific and residue are frequently adjusted to new detection methods. Penalization has reduced incidence below 0.5% (Carlsson and Bjorck 1989). In Costa Rica, there is no specific legislation.

The situation has improved since 1987, when more than 60% of the samples (pasteurized and non-pasteurized) presented contamination with penicillin above 0.01 IU/ml (Arias et al.1988). This outstanding reduction seems to result from the systematic control established in 1990 by the national milk industries. This evaluation has brought to the companies benefit because contaminants can represent loses in the production of yogurt, cream and other dairy products by inhibition of "starter" bacteriae.

Nevertheless, the problem persists specially in non-pasteurized milk: in the provinces of San José, Heredia and Cartago, more than 25% of the samples were positive, 17% in Alajuela province (Calderón, 1992).

The Costa Rican public administration should develop systems for controlling inhibitory agents and education to dairy cattle raisers on the correct use of antibiotics. The inhibition test for *B. stearothermophilus* growth should be adopted as official, with a maximun tolerance on 0.006 IU/ml for penicillin.

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