VOL. 6, NO. 11, NOVEMBER 2011 ISSN 1990-6145
ARPN Journal of Agricultural and Biological Science

www.arpnjournals.com

BETA-LACTAM ANTIBIOTICS RESIDUES IN PASTEURIZED MILK BY BETA STAR TEST IN THE NORTH WEST REGION OF IRAN

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ABSTRACT

One hundred and fifty pasteurized milk samples were collected from Tabriz supermarkets from April 2010 to September 2010 by systematic random sampling methods. All samples were examined by Beta star screening kit (Neogen, USA). Of all samples 4(2.66%) were positive for beta-lactam antibiotic residues in pasteurized milk in the northwest region of Iran. This study showed that the effective monitoring program must be run in the northwest region of Iran for control of beta-lactam antibiotic residues presence in milk.

Keywords: beta-lactam, residues, pasteurized milk, Tabriz.

INTRODUCTION

Milk is a well-known good medium that supports the growth of several microbes with resultant spoilage of the product or infections/intoxications in consumers (Murinda *et al*., 2004, Oliver *et al*., 2005). Antibiotics have been isolated and purified for use to control disease-producing bacteria. Several of hundred antibiotics have been isolated from various sources. Mastitis is the most prevalent disease in cattle which requires antimicrobial treatment (Suhren, V.G., 2002, Mohsenzadeh *et al*., 2008). Drug residues in milk have a potential hazard for the consumer and may cause allergic reactions, interference in the intestinal flora and resistant populations of bacteria in the general populations, thereby rendering antibiotic treatment ineffective (Dewdney *et al*., 1991). Consumers want to be confident that their food supply is free of contamination by herbicides, pesticides, drugs or antibiotics.

Concentration of 1 ppb of Penicillin, delay starter activity during dairy products making. Antibiotics also decrease the acid and flavor production associated with butter manufacture and they reduce the curdling of milk (Jones, G.M., 1990).

Beta-lactam is a group of antibiotics which are frequently used for the treatment of animals in Iran. Beta-lactam antibiotic residues in milk cause problems in dairy industries and in human health. (Ghidini *et al*., 2002).

There is no national antibiotic residue monitoring programme in Iran currently. There is not enough data on the occurrence of residues of antibiotics in milk and milk products. This is the first report, as far as we are aware, of beta-lactam antibiotic residues in pasteurized milk in Iran. We were unable to find reports in our search of the literature.

MATERIALS AND METHODS

One hundred and fifty (150) pasteurized milk samples were collected from Tabriz supermarkets from April 2010 to September 2010 by cluster random sampling methods. All samples were examined by Beta star screening kit (Neogen, USA). Beta Star US is a receptor assay for rapid detection of the beta-lactam antibiotics penicillin, ampicillin, amoxicillin, cloxacillin, and cephapirin. Extensively used in the prevention and treatment of dairy cattle disease, particularly mastitis. This test is validated for use with raw, commingled cow's milk.

The test involves a specific beta lactam receptor linked to gold particles. It is a dipstick test that detects penicillins and cephalosporins. The milk sample (0.2 ml) is added to a vial containing the test reagents (receptor protein linked to gold particles), mixed and incubated at 47.5°C in the incubator for 3 minutes. During incubation, the receptor will react with the free beta-lactams contained in the sample. After 3 min of incubation, the dipstick is added and incubation is continued (2 min at 47.5°C). The mixture is transferred to a strip of immuno-chromatography paper where it migrates towards the test field. With milk samples free of beta-lactam residues, the receptor protein will be captured by a biomolecule immobilized at the test field of the chromatography paper. Since the receptor protein is linked to gold particles, the captured protein-gold complex will appear as a pink-colored band. With the sample where the receptor protein has interacted with free beta-lactam molecules, the receptor protein will not be captured at the test field and no band will occur. The color intensity of the test band is visually compared with that of the reference band: if the color intensity of the test band is weaker than that of the reference band, the sample is classified as positive (Gustavsson, E., 2003, Gustavsson *et al*., 2004) (Figures 1 and 2) (Table-1).

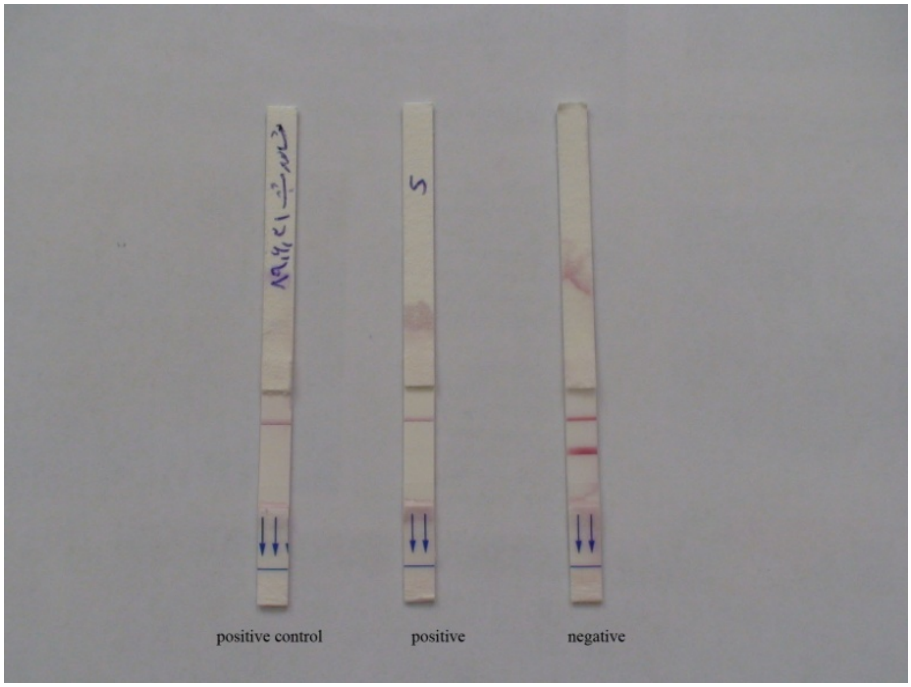

Figure-1. Chromatography papers.

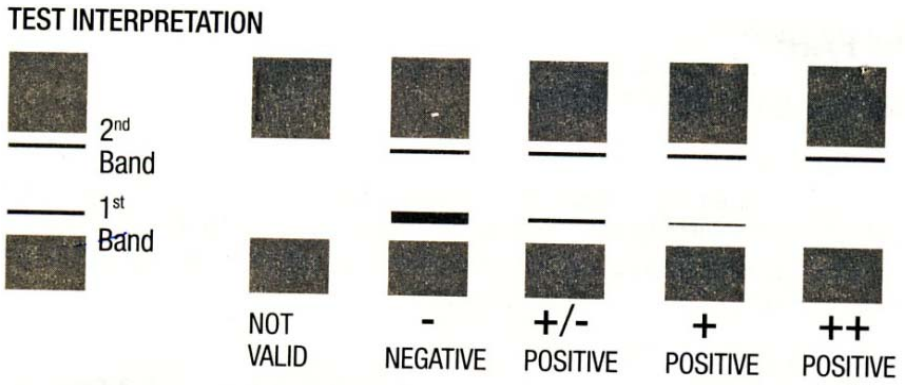

Figure-2. Beta star Kit Interpretation Quidde.

Table-1. MRL examples for milk in Europe, in the USA and for the Codex (ppb) (Anonymous, 2005).

Family	Molecule	Milk			
		MRL EU	MRL Codex	MRL USA	Beta star kit tolerance/safe limit
Beta-lactam antibiotics	Penicillin G (Penethamate)	4	4	5	5
	Ampicillin	4	-	10	10
	Amoxicillin	4	-	50	10
	Cloxacillin	30	-	10	10
	Cephapirin	60	-	-	10

RESULTS

Of all samples 4(2.66%) were positive for beta-lactam antibiotic residues in pasteurized milk in the northwest region of Iran (Figure-3).

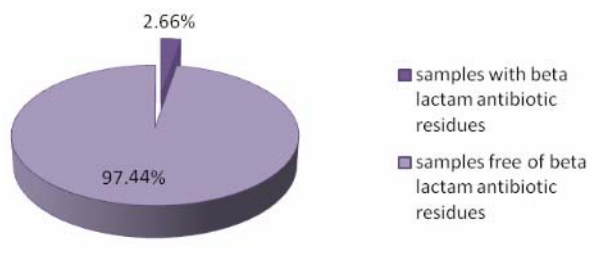

Figure-3. Percent of positive samples for beta-lactam antibiotic residues in pasteurized milk in the northwest region of Iran.

DISCUSSIONS

Nowadays, all beta-lactam antibiotics can be detected with Beta star kit. The result showed that beta-lactam antibiotic residues in milk were 2.66 percent which is considerable for pasteurized milk in Iran. Since this is the first report on beta-lactam antibiotic residues in pasteurized milk in Iran, It could be follow by other research in all of the country. In 2006, Khaskheli *et al*., showed that of all samples 36.5% were contaminated by beta-lactam antibiotic residues in cow raw milk in Pakistan (Khaskheli *et al*., 2008).

In a study by Ceyhan and Bozkurt from a total 200 milk samples collected from Ankara region, 5.5% was positive for antibiotic residues which is in agreement with our results in pasteurized milk in Tabriz (Ceyhan *et al*., 1987, Ergin kaya *et al*., 2010). Ardic and Durmaz (2006) reported 21.33% of beta-lactam antibiotic residues in unpacked milk consumed in Sanliurfa region, Turkey.

Aydin *et al*., in 204 raw milk samples, 44% was positive for antibiotic residues in Turkey which is higher than our results in pasteurized milk. Yamaki *et al*., in 2686 ewe raw milk samples, 1.7% was positive for antibiotic residues (Aydin *et al*., 1989, Ergin kaya *et al*., 2010).

Fonseca *et al*., (2009) studied on the incidence of antimicrobial residues in Brazilian UHT milk according to rapid yoghurt method. Of all 100 (100%) samples analyzed, 96 (96%) showed no traces of antibiotic residues while 4 (4%) indicated probable presence of antibiotic residues.

Adesiyun *et al*., (1997) studied the prevalence of antimicrobial residues in preprocessed and processed cow milk in Trinidad, and showed that 10.8% of all samples were positive. Shitandi (2001) showed 21% of 1109 milk samples were positive for antibiotic residues in Kenya.

Kang'ethe *et al*., (2005) showed 16% incidence of antibiotic residues in milk in Kenya. In 1995, Rybinska *et al*., studied on antibiotic residues in milk in Poland. Of all samples 13-22% was positive for antibiotic residues.

In addition to allergic reaction there is some indication in the science literature to suggest that antibiotics can induce cancer and other non-cancerous hazardous effects on the body. In Iran, especially in Tabriz, pasteurized milk is used more than the other milk products by all the age groups including infants and children, and it should be considered that, total daily antibiotic residues intake from milk could be an important risk factor for public health as well. This study showed that the effective monitoring program must be run in the northwest region of Iran for control of antibiotic residues presence in milk to obtain a safe product with no health risks to consumers.

ACKNOWLEDGEMENTS

This study was funded by Shabestar Branch, Islamic Azad University, as the research project (Research project code: 51955881111004).

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