



Scholars Research Library

Annals of Biological Research, 2011, 2 (2) : 95-98
(<http://scholarsresearchlibrary.com/archive.html>)



ISSN 0976-1233
CODEN (USA): ABRNBW

Detection of Beta Lactam Antibiotics Residues in Iranian Ultra High Temperature Milk by Beta Star Test

Mohammad Hosein Movassagh

Department of Veterinary Medicine, Shabestar Branch, Islamic Azad University, Shabestar, Iran

ABSTRACT

In Iran, UHT milk widely consumed by Iranian population of all ages. The presence of beta lactam antibiotic residues in UHT milk has a potential hazard for the consumer in any age. For this study one hundred fifty UHT milk samples were collected from Tabriz milk stores from June 2010 to October 2010 by systematic random sampling methods. All samples were examined by Beta star screening kit (Neogen, USA). Of all samples 7(4.66%) were positive for beta lactam antibiotic residues in UHT 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 UHT milk.

Keywords: Beta-lactam, Residues, UHT Milk, Iran.

INTRODUCTION

In Iran, UHT milk widely consumed by Iranian population of all ages. Antibiotics are invariably administered to cattle to control infectious diseases, but their indiscriminate use, without adequate veterinary control, can lead to a series of negative consequences at all levels of the dairy productive chain. Several of hundred antibiotics have been isolated from various sources. Antimicrobial agents are used in treatment of cattle and cause the presence of drug residues in milk. Mastitis is the most common disease in cattle which requires antibacterial drugs [1,2]. 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 [3]. Consumers want to be confident that their food supply is free of contamination by antibiotics especially with beta lactam antibiotics.

It seems that approximately 5-10 percent of the populations is hypersensitive to Penicillin at a concentration as low as 1 ppb or other antibiotics and suffers allergic reactions (skin rashes, hives, asthma, anaphylactic shock). Antibiotics also decrease the acid and flavor production associated with butter manufacture and they reduce the curdling of milk and cause improper ripening of cheese. In the fermented dairy products manufacturing, such as cheeses and yogurts, the presence of antibiotics and other antimicrobial agents can lead to the partial or total inhibition of the lactic bacteria growth[4].

Beta-lactam antibiotics are among the most commonly prescribed drugs, grouped together based upon a shared structural feature, the beta-lactam ring. Beta-lactam antibiotics include Penicillins, Cephalosporins, Cephameycins, Carbapenems, Monobactams and Beta-lactamase inhibitors. Beta-lactams are also administered to animals in feed for growth promotion and for collective prophylactic treatment. Beta lactam is a group of antibiotics which are frequently used for the treatment of animals in Iran. The maximum residues limit (MRL) for some beta lactam antibiotics in European Union, for example Penicillin G 4 µg/L, Ampicillin 4 µg/L, Dicloxacillin 30 µg/L, Cephalexin 100 µg/L and Cepharin 60 µg/L [5,6].

This is the first report, as far as we are aware, of beta lactam antibiotic residues in UHT milk in Iran. We were unable to find reports in our search of the literature.

MATERIALS AND METHODS

One hundred fifty UHT milk samples were collected from Tabriz milk stores from June 2010 to October 2010 by systematic 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 cephalosporin. 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 β-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 bimolecular 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 [7,8] (Figure 1) (Table1).

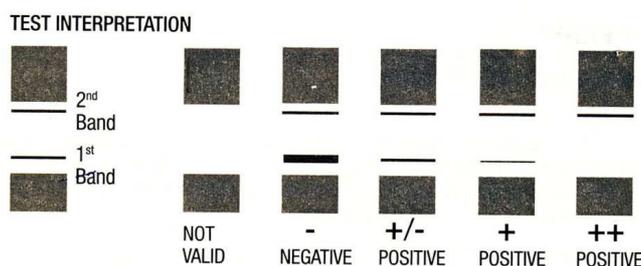


Figure 1. Beta star kit interpretation guide

Table 1. MRL examples for milk in Europe, in the USA and for the Codex (ppm)[9]

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
	Ampicilline	4	-	10	10
	Amoxicilline	4	-	50	10
	Cloxacilline	30	-	10	10
	Cephapirin	60	-	-	10

RESULTS AND DISCUSSION

At present study, of all samples 7(4.66%) were positive for beta lactam antibiotic residues in UHT milk in the northwest region of Iran, which is very high prevalence for Iran.

Beta star kit can detects all kind of beta lactams in milk. The result showed that beta lactam antibiotic residues in milk were 4.66 percent which is high for UHT milk in Iran. Since this is the first report on beta lactam antibiotic residues in UHT milk in Iran, It could be follow by other research in all of the country. In Iran, Movassagh et al. showed that 5% of cow raw milk was positive for antibiotics residues [10].

Aydin et al. [11] in 204 raw milk samples, 44% was positive for antibiotic residues in Turkey. Yamaki et al. [12] reported in 2686 ewe raw milk samples 1.7% positive for antibiotic residues in Spain. Khaskheli et al. [13] showed that of all samples 36.5% were contaminated by beta lactam antibiotic residues in cow raw milk in Pakistan.

In the United States of all 1988 studies, 71% of test samples from farms tested were positive for antibiotics residues [14].

Adesiyun et al. [15] studied the prevalence of antimicrobial residues in preprocessed and processed cow milk in Trinidad, and reported that 10.8% of all samples were positive. Shitandi [16] showed 21% of 1109 milk samples were positive for antibiotic residues in Kenya.

In Turkey, there are only a limited number of antibacterial residues studies in milk. In a study by Ceyhan [17] and Bozkurt [11] from a total 200 milk samples collected from Ankara region,

reported 5.5% positive samples for antibiotic residues.

In human medicine drug allergy is a well-established side-effect of the therapeutic use of antibiotics, especially the beta-lactams. The monitoring of beta-lactam residues in edible tissues and milk is important because of the hypersensitivity of some individuals to these antibiotics and also the emergence of antibiotic-resistant strains of bacteria. 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 [14].

CONCLUSION

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 and adequate veterinary control should be established in Iran.

Acknowledgments

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

REFERENCES

- [1] V.G. Suhren. *Kieler. Milch. Forsch.*, **2002**, 54, 35-71.
- [2] M. Mohsenzadeh, and A. Bahrainpour. *Pakistan. J. Biol. Sci.*, **2008**, 11, 2282-2285.
- [3] J.M. Dewdney, J.P. Maes, F. Raynaud and J.P. Scheid. *Food. Chem. Toxicol.*, **1991**, 29, 477-483.
- [4] G.M. Jones, www.sites.ext.vt.edu/newsletter-archive, September **2010**.
- [5] S.M. Ghidini, E. Zanardi, G. Varisco and R. Chizzolini. *Ann. Fac. Medi. Vet. Di Parma.*, **2002**, 22, 245-252.
- [6] J.D. Pitout, C.C. Sanders, and W.E. Sanders, Jr. *Am. J. Med.*, **1997**, 103, 51.
- [7] E. Gustavsson, PhD thesis, Swedish University of Agricultural Sciences, (Sweden, Uppsala, **2003**).
- [8] E. Gustavsson and A. Sternesjo, *J. AOAC. Int.*, **2004**, 87, 614-620.
- [9] Veterinary Drug MRL Database, www.mrldatabase.com/selectedcommoditygroup, October **2005**.
- [10] M.H. Movassagh, and A.R. Karami, **2010**, 5, 3, 195-197.
- [11] S. Ergin kaya, and A. Filazi, *Kafkas. Univ. Vet. Fak. Derg.*, **2010**, 16, S31-S35.
- [12] N. Aydmn, M. Cambazoğlu, and H. Ayhan, *Etlik. Vet. Mikrobiyol. Derg.*, **1989**, 6, 11-22.
- [13] M. Khaskheli, R.S. Malik, M.A. Arain, A.H. Soomro and H.H. Arain. *Pakistan. J. Nut.*, **2008**, 7, 682-685.
- [14] Milk Safety Branch, HFF-346, , www.cfsan.fda.gov/~ear/mi02-1.html, Septamber **2005**.
- [15] A.A. Adesiyun, and L.A. Webb, *J. Food. Safety.*, **1997**, 16, 301-310.
- [16] A. Shitandi, *J. Food. Safety.*, **2001**, 21, 205-214.
- [17] I. Ceyhan, and M. Bozkurt, *Turk. Hij. Den. Biyol. Derg.*, **1987**, 44, 1-5.