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Melamine testing of meat, eggs and diary products sold in Incheon

Do-Kyung Ra*, Seong-Hee Hong, Jeong-Gu Lee, Sung-Mo Lee

Incheon Metropolitan City Institute of Health & Environment

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Abstract

From Oct. 2008 to Oct. 2009, 619 livestock products sold in Incheon were examined for melamine contamination. HPLC was used to detect the melamine concentration from various products. C_{18} column (3.9×150mm, 4μm) was applied with a phase composed of 10mM citric acid and 10mM sodium octane sulfonate : acetonitrile (in ratio 90:10) pumped isocratically at 1.0ml/min. Melamine was not detected from any of the products at the level of LOD 0.03mg/kg and LOQ 0.08mg/kg, suggesting that no melamine contamination was ascertained in livestock products in Incheon area. However, further tests should be done to detect other melamine analogues for the evaluation of toxicity and safety of melamine and cyanuric acid in the future.

Key words : Melamine, Livestock products, HPLC, Cyanuric acid

INTRODUCTION

Melamine (2,4,6-triamino-1,3,5-triazine) is an industrial chemicals in the production of melamine resins which are used in laminates, glues, adhesives, and plastics. The use of melamine to protein-rich ingredients can induce the increase of protein contents which is measured by total nitrogen concentration analysis (Ingelfinger, 2008). The main toxic effects of exposure to melamine are formation of bladder stones and hyperplasia in the urinary bladder (IARC, 1999). In March of 2007, pet food ingredients contaminated with melamine and its analogues, ammeline, ammelide, and cyanuric acid, caused unknown death related with renal disorders in cats and dogs in the USA (FDA, 2009). On Sep. 11, 2008, Death of infants fed melamine contaminated milk hit the China. It has caused an international panic and follow-up measures were done by the countries importing food additives from china (Chan et al, 2008). In Korea, Korea Food & Drug Administration (KFDA) and National Veterinary Research & Quarantine Service (NVRQS) examined all imported products from China such as milk, infant formulas, dairy products, and products containing aforementioned materials and recalled all melamine contaminated products. Ministry for Food, Agriculture, Forestry and Fisheries (MIFAFF) gave direction to examine all livestock products because of possible melamine residues in the products. This report showed the status of the melamine contamination of the relevant products sold in Incheon area.

MATERIALS AND METHODS

619 livestock product samples distributed in Incheon were collected and examined from Oct in 2008 to Oct in 2009. Sample preparation and HPLC analysis were performed following the procedures outlined by the experiment guideline of NVRQS (2008). After the notification of melamine residue limits and experi-

* Corresponding author: Do-Kyung Ra, Tel. +82-32-440-5574, Fax. +82-32-440-5582, E-mail. rara9292@korea.kr

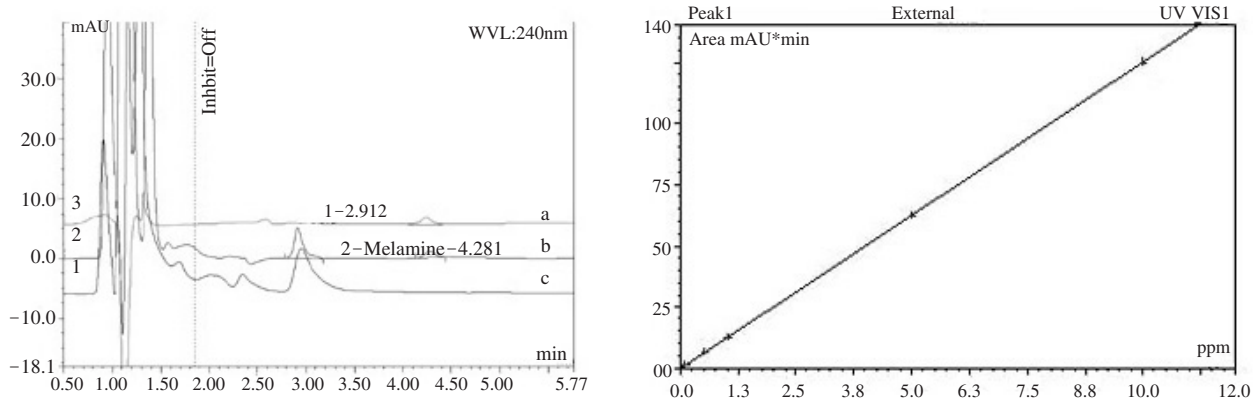

Fig. 1. Chromatogram and standard calibration curve of melamine ($\gamma^2 > 0.999$). a: 0.1mg/kg of melamine, b: sample fortified with 0.1mg/kg of melamine, c: blank sample.

Table 1. Melamine detection according to the types of samples

Samples	No. of samples	Result
Meat	230	N.D.
Packing meat	44	N.D.
Dairy products	40	N.D.
Processed egg products	9	N.D.
Processed meat products	296	N.D.
Total	619	

N.D.: Not detected

mental method on 2 Mar in 2009, the analysis was processed by Food Code of KFDA (2009). HPLC analyses were performed on a Dionex (UV/VIS) HPLC system with column oven temperature maintained at 30℃, using an C_{18} column (3.9 × 150mm, 4μm particle size). Mobile phase composed of buffer solution (10mM citric acid and 10mM sodium octane sulfonate, pH 3.0) and acetonitrile in ratio 90:10, pumped isocratically at a flow rate of 1.0ml/min. The injection volume was 20μl, and the effluent was monitored at 240nm.

RESULT

There were no products which were contaminated with melamine. Although two sausage products were made of melamine-contaminated albumen powder, melamine was not detected from the products. The detailed results classified by the type of samples was shown in Table 1. The limit of detection (LOD=3.3 × (s/S)) and the limit of quantification (LOQ=(10 × (s/S)) for melamine were defined as 0.03mg/kg and 0.08mg/kg, respectively. The average recovery rate was 83.12 ±1.7%, and the linearity of a standard curve was higher than 99.99 % (Fig. 1).

DISCUSSION

The recent melamine outbreak represents one of the largest deliberate food contamination incidents. Because of the significant consequences of melamine-contaminated milk from China, it brought a lot of attention to the toxicity of melamine and its analogues including cyanuric acid in conjunction with food safety in many countries as well as Korea (Park et al, 2009). Cyanuric acid may be found as an impurity of melamine and is an FDA-accepted component of feed-grade biuret, a ruminant feed additives (WHO, 2008). Jeong et al.(2009) reported that combined toxicity of melamine and cyanuric acid is 100 times stronger than single toxicity of melamine alone. Examination of melamine structural analogues as well as melamine should be performed to evaluate their residual toxicity as a potential risk to animals and humans in the future.

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