CHAPTER I
INTRODUCTION

1.1 Background and Justifications

Melamine contamination in food and feed has become an interesting topic for nutritionists, veterinary personnels, feed mills and farmers in recent years. The United Stated Food and Drug Administration (U.S.FDA, 2007) identified and reported melamine as a suspected contaminant in certain pet foods and pet food products linked to renal failure in some dogs and cats. This has resulted in a large scale recall of these products from store shelves across North America. The presence of melamine has not been conclusively linked to the deaths of any animals, because of its relatively low toxicity at low levels. Nonetheless, the U.S.FDA has blocked importation of wheat gluten from a Chainese supplier, pending completion of an investigation. Therefore, in line with the actions taken by the authorities, and although there is no evidence that contaminated wheat gluten or rice protein concentrate or any other protein source originating from Chaina have been imported into the Europien Union, Member States have been asked by the Commission to control consignments of wheat gluten, corn gluten, corn meal, soy protein, rice bran and rice protein concentrate originating from third countries and in particular from China, for the presence of melamine and structurally related compounds such as cyanuric acid, ammeline and ammelide (FDA, 2007). Corn gluten is commomly used in poultry and layer feed as it is high in protein and offers pigmentation such as xanthophylls which improve egg yolk and skin colour. Because the CP content of feeds and foods are calculated from their N content (AOAC, 2000), added melamine can boot the CP content of the products so as to make them appear to have more protein to reduce the cost.

Melamine is a nitrogen-rich heterocyclic triazine used primarily in the synthesis of melamine-formaldehyde (MF) resins for the manufacture of laminates, plastics, coatings, commercial filters, glues or adhesives, and moulding compounds (dishware and kitchenware) (Bizzari and Yokose, 2008). Melamine is also reportedly used as a colorant (paint coating) and as a fertilizer. Melamine alone is not poisonous. Scientists hypothesize that melamine together with cyanuric acid probably interacted to form kidney or bladder stones leading to kidney failure in some animals. Both melamine and urea-formaldehyde (UF) are known human health threats and MF releases monomers of both (Ishiwata et al., 1986; Bradley et al., 2005). UF resin are the more important type of pelleting binders in both animal and aqua feeds. Many consumer product containing formaldehydes based resins release formaldehyde vapor, leading to consumer dissatisfaction and health related conplaints.

Methods for the analysis of melamine and UF in foods and animal feeds such as enzyme-linked immunosorbent assay (ELISA), high-performance liquid chromatography (HPLC), gas chromatography-mass spectrometry (GC-MS) methods can be used as a confirmatory and/or a screening method. The relative selectivity, sensitivity, time and cost of the various techniques are indicated as well. Therefore, modification spectrophotometric methods (Hirt et al., 1955) as it usually normal laboratory useful. Moreover, using spectrophotometry were conventional rapid screening methods as a low cost and easy.

Documented research results pertaining to melamine in production animal diets are limited. Clark (1966) reported that an intake of >10g/d resulted in crystalluria to sheep and Mackenzie (1966) also reported weight loss and mortalities when melamine was fed sheep. Although Newton and Utley (1978) showed that melamine is not an efficient N source for ruminants. Effect of graded levels of melamine in young turkey poults have been reported by Brand et al. (2009) with the diets contained 0-3.00% melamine. Significant mortality was observed in turkeys fed >3.00% melamine. Due to the high mortality in birds fed ≥2.00% melamine. Moreover, Lu et al. (2009) reported in ducks fed levels of melamine (0-1,000 mg/kg of diet) from d1 to 42, no visible signs of ill health or

changes in the behavior of ducks, and no difference ($P>0.05$) in weight gain. The residual levels of melamine in duck tissues were below the detection limit when diets contained less than 50 mg/kg melamine. On d 42, melamine levels in breast meat, liver and kidney increased linearly ($P<0.05$) with melamine >50 mg/kg. The kidney was found to accumulate the highest concentration of melamine. Ledoux et al. (2009) also report of graded levels of melamine in young broiler chicks from hatch to 14 days with diets containing 0-3.00% melamine. Results indicate that melamine concentrations ≥1.00% depressed growth performance, whereas melamine concentrations ≥2.00% caused increased mortality, crystal formation in bile, and histopathologic lesions in kidney.

No literature could be found on the poultry degradability of melamine, but it is expected that melamine would be degraded to some extent (Cruywagen et al., 2009). According to the report of an expert meeting of the World Health Organization (2008), melamine and cyanuric acid are rapidly absorbed in monogastric animals and excreted unmetabolized in the urine. The problem is that melamine combines with cyanuric acid on a 1:1 basis to form spoke-like melamine cyanurate crystals from aqueous solutions at a pH 5.8 or below (He et al., 2008). The objective of this study was to assess the effects of melamine or UF alone and in combination when fed to broiler chicks and hen layer on growth performance, carcass quality and to describe any clinical changes of organs, thereby providing crucial graded levels information for evaluating the significance of the contaminants in the recalled livestock feed.

1.2 Hypothesis

1.2.1 Spectrophotometric methods could conventional rapid screening of melamine and UF.

1.2.2 Melamine or UF or their equal mixtures supplementation could affect growth performance and carcass quality in broilers.

1.2.3 Melamine or UF or their equal mixtures supplementation could affect laying performance and egg quality in layers.

1.2.4 Melamine or UF or their equal mixtures supplementation could affect mortality.

1.2.5 Melamine or UF or their equal mixtures supplementation could affect on internal organ lesions of broilers and layers.

1.3 Objectives

1.3.1 To study suitable spectrophotometric technique that can apply for rapid screening melamine and UF.

1.3.2 To study on effect of melamine or UF or their equal mixtures on growth performance and carcass quality of broilers.

1.3.3 To study on effect of melamine or UF or their equal mixtures on laying performance and egg quality of layers.

1.3.4 To study on the toxic level of supplementation melamine or UF or their equal mixtures in broilers and layers.

1.3.5 To study on effect of melamine or UF or their equal mixtures on internal organ lesions of broilers and layers.

1.4 Expected Outcomes

1.4.1 To obtain the suitable technique for conventional rapid screening of melamine and UF in soybean products and chicken feeds.

1.4.2 To obtain the toxic level of melamine or UF or their equal mixtures supplementation in broiler and layer diets without any adverse effect.

1.4.3 To obtain the optimum for justifications the toxic levels of melamine or UF in chicken feeds.