

# P-302 Determination of PCDDs/DFs and Dioxin-like PCBs in Egg and Fish Feed Samples in Taiwan by the DR CALUX® Bioassay



Shyu TS, Lee YH, Lee ML, Lu SY, Chu C, Wu CI, and Kao CW

Taiwan Agricultural Chemicals and Toxic Substances Research Institute, Council of Agriculture ( TACTRI/COA )

## Abstract

After an in-depth training and a 3-phase cross-validation by staff of the BioDetection Systems (BDS), we obtained the license for the DR CALUX® bioassay. The control charts were initially set up by using 1 pM and 3 pM 2,3,7,8-TCDD and two certified reference materials for quality assurance and quality control (QA/QC) of performing the DR CALUX® bioassay in our laboratory. Thirty-one egg, six eel-feed, nine seabass-feed, and eight tilapia-feed samples were collected and their fat contents were determined to be  $10.3 \pm 1.1\%$ ,  $9.2 \pm 1.0\%$ ,  $11.5 \pm 2.5\%$ , and  $8.2 \pm 1.3\%$ , respectively. By the DR CALUX® bioassay, dioxins and dioxin-like compounds were determined to be  $2.0 \pm 0.7$  pg DR CALUX-TEQ/g fat,  $0.4 \pm 0.1$  ng DR CALUX-TEQ/kg product,  $0.9 \pm 0.6$  ng DR CALUX-TEQ/kg product, and  $0.3 \pm 0.1$  ng DR CALUX-TEQ/kg product, respectively, which were all below the EU-limits for egg and fish feeds.

## Introduction

### Purpose :

Using DR CALUX® bioassay from the BDS to screen dioxin and dioxin-like compounds in fishery, poultry, livestock products, and various feeds.

### QA/QC of the bioassay performing :

Setting up the control charts of 1 pM and 3 pM 2,3,7,8-TCDD and two certified reference materials (CRMs).

### Real samples measurement :

Determining the dioxin and dioxin-like compounds in fish feed and egg samples.

## Material & Methods

### Samples :

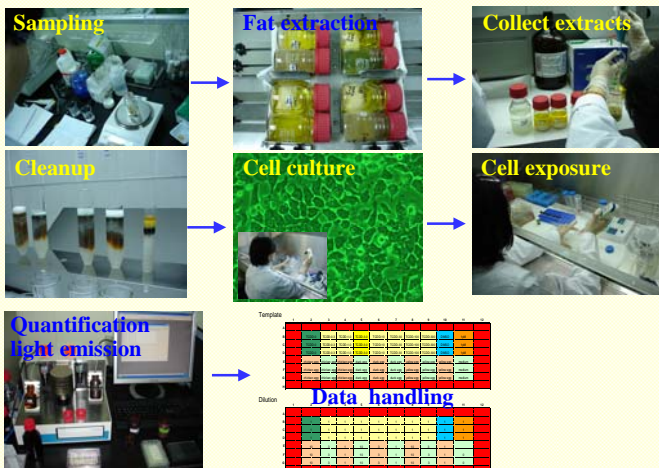
**2 CRMs:** one fish oil and one feed sample from the BioDetection Systems.

**31 egg samples** ( from chicken farms, supermarkets, vendors )

**23 fish feeds samples** ( from 6 eel, 9 seabass and 8 tilapia aquaculture farms )

**Method :** DR CALUX® ( Dioxin Responsive Chemical Activated Luciferase gene expression )

### The procedures of the DR CALUX® assay



## Results

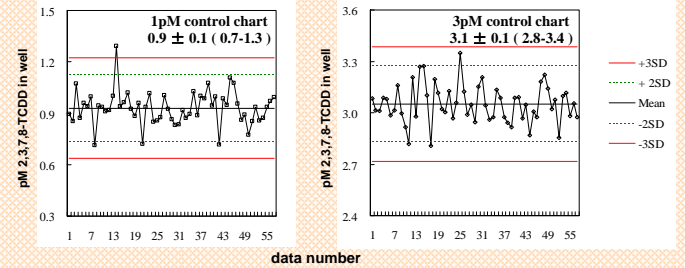


Fig 1. The control charts of 1 pM and 3 pM 2,3,7,8-TCDD are being used to monitor the performance of DR® CALUX .

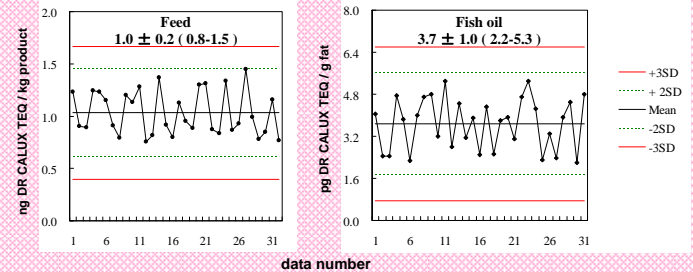


Fig 2. Control charts of the two certified reference materials, one feed and one fish oil samples. The analysis results of these two certified reference materials are all within the mean value  $\pm$  3SD.

Table 1. Fat contents and the DR CALUX® analysis results of dioxins and dioxin-like compounds in egg and fish feed samples

Sample	Number of sample	Fat content (%)	Dioxin and dioxin-like compounds (pg DR CALUX TEQ /g fat) <sup>1</sup> or (ng DR CALUX TEQ /kg product) <sup>2</sup>
Eggs	31	$10.3 \pm 1.1$ (7.8~12.2) <sup>1</sup>	$2.0 \pm 0.7$ (1.3~4.8) <sup>1</sup>
Fish feeds	23		
eel-feed	6	$9.2 \pm 1.0$ (7.9~10.4)	$0.4 \pm 0.1$ (0.2~0.5)
seabass-feed	9	$11.5 \pm 2.5$ (5.9~14.5)	$0.9 \pm 0.6$ (0.3~1.7)
tilapia-feed	8	$8.2 \pm 1.3$ (6.1~10.2)	$0.3 \pm 0.1$ (0.2~0.5)

<sup>1</sup> Numbers represent mean  $\pm$  SD with the ranges shown in parentheses.

<sup>2</sup> Unit for egg is (pg DR CALUX TEQ /g fat), for feed is (ng DR CALUX TEQ /kg product).

## Conclusions

- According four control charts indicating the DR CALUX® performing system is under controlled and kept at relatively stable condition.
- The dioxin and dioxin-compound contents of all of the 31 egg samples and 23 fish feed samples were lower than the EU limit for egg, i.e., 6 pg WHO-PCDD/F-PCB-TEQ/g fat, and for fish feed, i.e., 2.25 ng WHO-PCDD/F-PCB-TEQ/kg product.

