

2019 PhD Proposal – CSC-NCD CRCC Joint Funding Programme

Information to be published on NZ-CFPN CRCC website if proposal is selected	
Project title	Risk assessment for Polycyclic Aromatic Hydrocarbons (PAHs) in raw milk based on Physiologically based Toxicokinetic (PBTK) Models
Supervisor title and name	Dr Harvey Ho ¹ , A/Prof Nan Zheng ² , A/Prof Rongwei Han ³
Department	
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University	¹ The University of Auckland, Auckland, New Zealand ³ Qingdao Agricultural University, Qingdao, China
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Link to Supervisor's research page	https://unidirectory.auckland.ac.nz/profile/hwe001
Project outline 150-300 words (approx) describing a possible PhD project, which has a link with an existing or potential research partner in China	<p>Polycyclic Aromatic Hydrocarbons (PAHs) in food products may cause serious health problems and/or genetic defects in humans and animals. Animal feed is an important source of PAHs, which has been detected in raw milk in recent years, and become an important risk factor affecting the milk quality and safety [1]. According to literature, transfer rates to milk for PAHs range from 0.5% to 8% [2], yet the exact transfer mechanism remains unknown.</p> <p>In this PhD project we propose to use PBTK models to simulate the absorption, distribution, metabolism and excretion of PAHs in dairy cows. We will adopt our current PBTK model and incorporate PAH-specific disposition and clearance parameters. Where toxicokinetic parameters for PAHs are not available these will be estimated from the QSAR method. The aim is to provide predictions and risk assessments for different feed intake and environment pollutant scenarios for PAHs transfer to raw milk in cows.</p> <p>Two sets of experiments will be performed. Firstly, PAHs will be detected from the raw milk samples in the Milk and Dairy Product Risk Assessment Laboratory of the Ministry of Agriculture, China. Each year 500 raw milk samples are collected from 250 dairy farms in five provinces of China and analysed in this national key laboratory. Secondly, one dairy farm with high PAH risks will be identified and chosen for detailed PAHs profile analysis. This includes measurements of PAHs in feed and the pharmacokinetic profiles of PAHs in raw milk during a one-week timeframe. These data will then be compared with the simulation results of the PBTK model for model parameter adjustment, and guidance for model-experiment iterations.</p> <p>Research results of this project will be disseminated to DCZNZ and NZFSSRC for knowledge sharing about the risk assessment of PAHs.</p>
References for further reading (optional)	<p>[1] García Londoño, Víctor Alonso, Cora Marcela Reynoso, and Silvia Resnik. "Polycyclic aromatic hydrocarbons in milk powders marketed in Uruguay." <i>Food Additives & Contaminants: Part B</i> 10, no. 4 (2017): 284-291.</p> <p>[2] Rychen, G., S. Jurjanz, H. Toussaint, and C. Feidt. "Dairy ruminant exposure to persistent organic pollutants and excretion to milk." <i>Animal</i> 2, no. 2 (2008): 312-323.</p>
Additional information to be used in proposal selection process	
NZCFPN CRCC priority area to which proposal is aligned (see list below)	Risk assessment and mitigation
Brief outline of Supervisor's current research links with China or interest in developing them	Dr Ho has collaborations with several institutions in China (e.g. Qingdao Agricultural University, Lanzhou Institute of Husbandry and Pharmaceutical Sciences CAAS) on modelling and imaging for meat and dairy products, and veterinary pharmacokinetics. This multidisciplinary project will be our first collaboration project with China on simulating drug/environment pollutant residue in milk products and risk assessments.

Please return completed 2019 proposal to Michal Dunn at m.j.dunn@massey.ac.nz by no later than 31 October 2018

NZ-CFPN CRCC priority areas:



- Big Data and digital technologies
- Traceability
- Packaging
- Food security, including food waste
- Animal health & production
- Advanced diagnostic tools & analytics
- Risk assessment and mitigation
- Market & consumer perceptions
- Genomics and related technologies
- Chemometrics