

Heavy Metal Detection

Preliminary Investigation into the detection of heavy
metal using Raman spectroscopy

Project code
2023-1012

Prepared by
Dr Stephanie Fowler

Date submitted
17/09/2024

Disclaimer The information contained within this publication has been prepared by a third party commissioned by Australian Meat Processor Corporation Ltd (AMPC). It does not necessarily reflect the opinion or position of AMPC. Care is taken to ensure the accuracy of the information contained in this publication. However, AMPC cannot accept responsibility for the accuracy or completeness of the information or opinions contained in this publication, nor does it endorse or adopt the information contained in this report.

No part of this work may be reproduced, copied, published, communicated or adapted in any form or by any means (electronic or otherwise) without the express written permission of Australian Meat Processor Corporation Ltd. All rights are expressly reserved. Requests for further authorisation should be directed to the CEO, AMPC, Northpoint Tower, Suite 1, Level 29, 100 Miller Street North Sydney NSW.

Project description

Current methods for monitoring heavy metal concentrations such as cadmium in livers are laboratory-based methods which are slow, resource-intensive and costly. Given the “chemical fingerprint” and sensitivity of Raman spectroscopy, this project investigated its potential to rapidly screen beef livers for the presence or absence of heavy metals and residues which would enable industry to safeguard their interests with robust and widespread assessment for heavy metals.

Project content

Raman spectra were taken on livers from 906 beef cattle including 174 livers from low-risk, 465 from medium risk 267 and from high-risk postcodes which are removed from the supply chain before livers were sampled for laboratory measurements.

Project outcome

Of the livers sampled, 114 livers from the high-risk samples and 26 of the livers sampled in the medium risk category had concentration of Cd concentration greater than 0.

Modelling was able to classify livers based on risk category but models to classify samples into low (0 – 0.1 mg/kg), medium (0.1 – 1 mg/kg) and high (>1mg/kg) groups based on their Cd concentrations was not possible as the incidence was too low.

Despite the low incidence of cadmium, some spectral differences were noted which may be related to the biochemical changes which occur when cadmium accumulates in livers.

Benefit for industry

Overall, this project suggests the incidence of cadmium in livers from cattle may be lower than previously reported with only 11% of livers yielding concentrations of cadmium above the limit of reporting (LOR).