

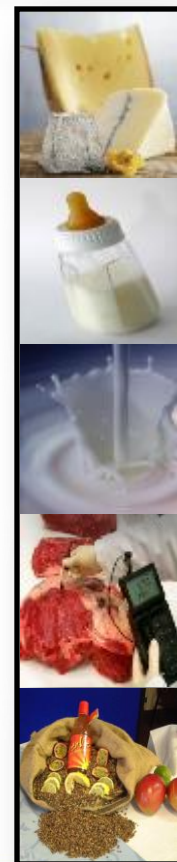
Chlorates in Whole Milk Powder Impact of Process Conditions

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Introduction

- ❑ Raw milk sourced from AGRIC herd
- ❑ Standard and chlorate free detergents used for CIP of milking equipment
- ❑ Raw milks were pasteurised, homogenised, evaporated and sprayed using the large pilot scale process in MTL
- ❑ 400 kg of WMP was produced (4000 L milk)
- ❑ CIP of all process equipment was carried out using standard chemicals and flushing procedures
- ❑ Process water was treated Sodium Hypochlorite
- ❑ The effect of final flushing and stabilisation of process equipment with RO water was evaluated relative to chlorate levels
- ❑ 16 samples were analysed for chlorate levels by Labor Friedle GMBH

Trial 1 – Standard Farm Detergents and CIP Regime

Key:
Starting Material
Unit Operation
Intermediate Stream
Finished Material

→ Standard Plant CIP, flush and stabilisation with chlorinated process water
→ Standard Plant CIP, flush and stabilisation with RO water

Reverse Osmosis Plant



Evaporator

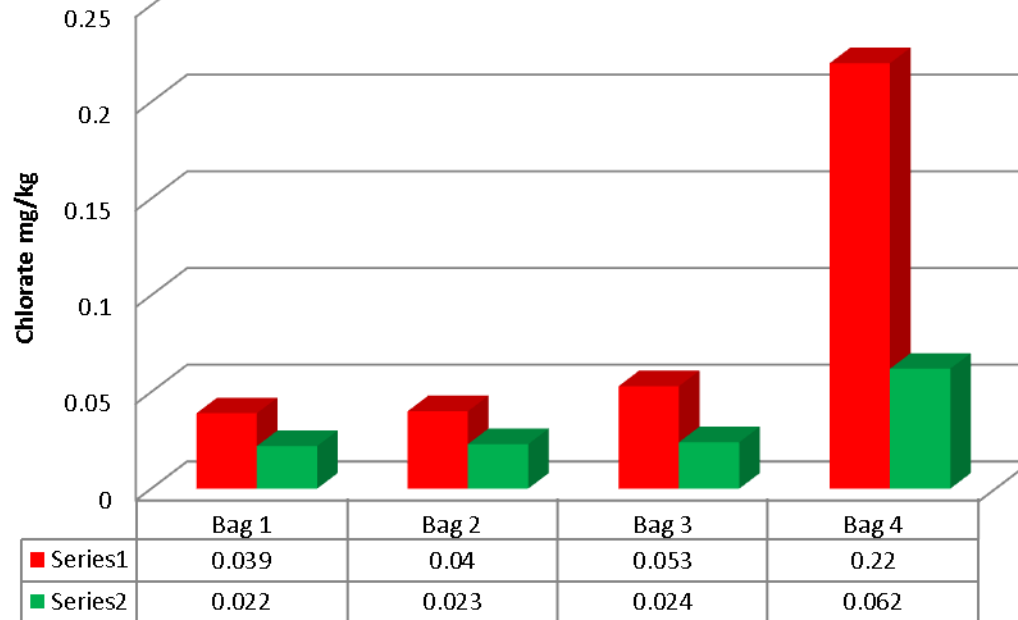


Spray Dryer



Whole Milk

Chlorate mg/kg



Pasteuriser



High Chlorate WMP
Low Chlorate WMP



Trial 2 – Chlorate Free Farm Detergents and CIP Regime

Key:
Starting Material
Unit Operation
Intermediate Stream
Finished Material

→ Standard Plant CIP, flush and stabilisation with chlorinated process water
 → Standard Plant CIP, flush and stabilisation with RO water

Reverse Osmosis Plant



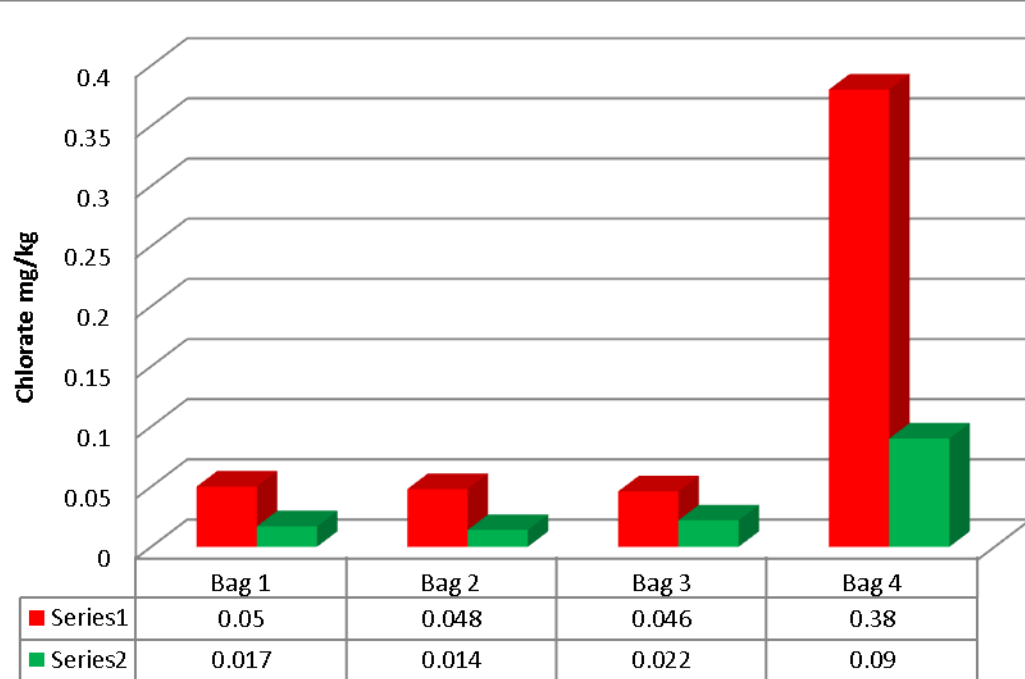
Evaporator



Spray Dryer



Whole Milk



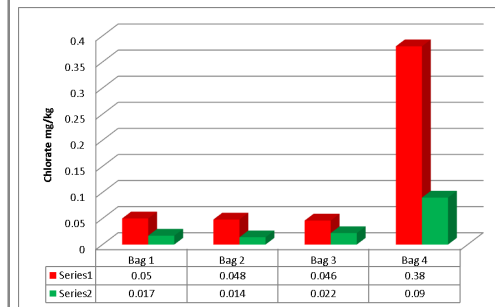
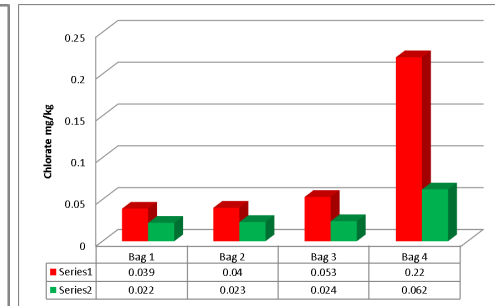
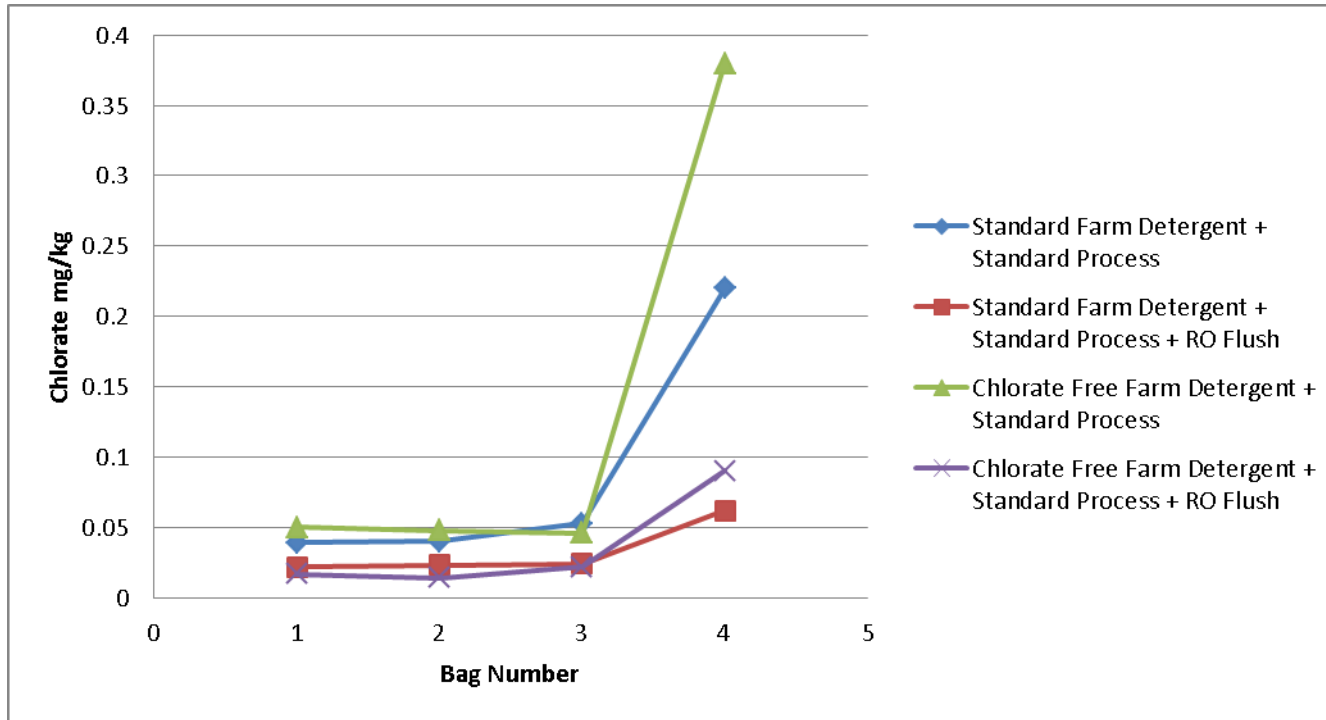
Pasteuriser



High Chlorate WMP
 Low Chlorate WMP



Conclusion



- ❑ Essentially no impact from milking machine washing regime on finished powder chlorate levels
- ❑ Standard CIP with RO water final flush reduced chlorate levels in finished powder from 0.046 to 0.020 mg/kg compared to standard process water flushing
- ❑ Stabilisation (not measured) and product changeover (introduction of water into the dryer) in the dryer can create very high localised chlorate levels ~ 0.38 mg/kg