Chlorates in Milk

'sample results to date'

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Identify a suitable accredited laboratory for chlorate analysis

- **Labor Friedle GmbH**
  - **Von-Heyden-Strabe 11**
  - **D93105 Tegernheim, Germany**

  - **Accredited for chlorate & Perchlorate analysis**

  - **Sample Quantity required for each sample type**
    - **- powder: 100 g**
    - **- water: 50 – 100 ml**
    - **- detergent: 10 – 50 ml**

Limit of Quantification

- **Detergent- 0.50 mg/kg**
- **Water- 10 mg/kg**
- **Milk, powder- 0.01 mg/kg**

- **Cost per sample= €80**

Questions on chlorate residues in milk- addressed to date at Moorepark

1. **Can high TCM milk be used as an indicator of the presence of chlorates in milk**
2. **Does freeze drying milk samples increase the likelihood of detection**
3. **Is it possible that the freeze drying process is causing development of chlorate**
4. **Do detergent steriliser products contain chlorates**
5. **Do chlorine free products contain chlorates**
6. **Do out of manufacture date products contain higher levels of chlorates?**
7. **Will chlorates be detected in water with added chlorine**
8. **Will chlorates be detected in milk powder if milk TCM is close to TCM limit (0.0015 mg/kg)**
9. **Will reconstituted powder give similar chlorate levels as that detected in the milk, assuming de-ionised/distilled water - awaiting results**

Can high TCM milk samples be used as an indicator of chlorate levels in milk ?- NO

Milk Sample	Milk TCM level* (mg/kg)	Chlorate level detected (0.01mg/kg)
1	0.0568	NDT
2	0.0475	NDT
3	0.0309	NDT
4	0.0286	NDT
5	0.0238	NDT
6	0.0238	NDT
7	0.0100	NDT
8	0.0044	NDT
9	0.0073	NDT
10	0.0040	NDT

* Normal TCM target level =0.0015mg/kg

Does freeze drying of milk samples increase the likelihood of chlorate detection-YES

TCM-milk (mg/kg)	Chlorate-milk (mg/kg)	Chlorate-powder (mg/kg)
0.0100	NDT	0.030 (30 ppb)
0.0044	NDT	0.036 (36 ppb)
0.0073	NDT	0.039 (39 ppb)
0.0040	NDT	0.063 (63 ppb)

Detection limit 0.01 mg/kg (milk & powder)

Is it possible that the freeze drying process is causing development of chlorates—NO?

TCM –Milk (mg/kg)	Chlorate-Milk (mg/kg)	Chlorate-Powder (mg/kg)
0.0000	NDT	NDT
0.0000	NDT	NDT
0.0001	NDT	NDT
0.0001	NDT	NDT

Milk direct from 4 cows

Detection limit 0.01 mg/kg (milk & powder)

Are there chlorates in chlorine and in detergent/chlorine cleaning products - YES

& do out of manufacture date influence the levels of chlorate- YES

Sample type	Chlorate level detected (mg/kg)
New chlorine product (10% chlorine)	29,000
Old chlorine (6 months)	36,000
New detergent /chlorine product (3.5 % chlorine)	5,800
Old detergent/chlorine (6 months)	12,000

Detection limit = 0.50 mg/kg

If milk is spiked with chlorine or detergent/chlorine cleaning products can chlorates be detected-YES
& will higher levels be detected if products are out of date- YES

Cleaning Product	Chlorate level detected (mg/kg)	Limit of detection (mg/kg)
Milk + new chlorine	100 (100,000 ppb)	0.01
Milk + old chlorine	200 (200,000 ppb)	0.05
Milk + new detergent/chlorine	32 (32,000 ppb)	0.01
Milk + old detergent/chlorine	39 (39,000 ppb)	0.05

Are chlorates present in non-chlorine products- YES

Detergent cleaning Product	Chlorate level detected (mg/kg)
Sodium Hydroxide SO Liquid -30% (commonly used in processing plants)	41 (41,000 ppb)
Sodium Hydroxide Powder- 76% (commonly used on farm)	9 (9,000 ppb)

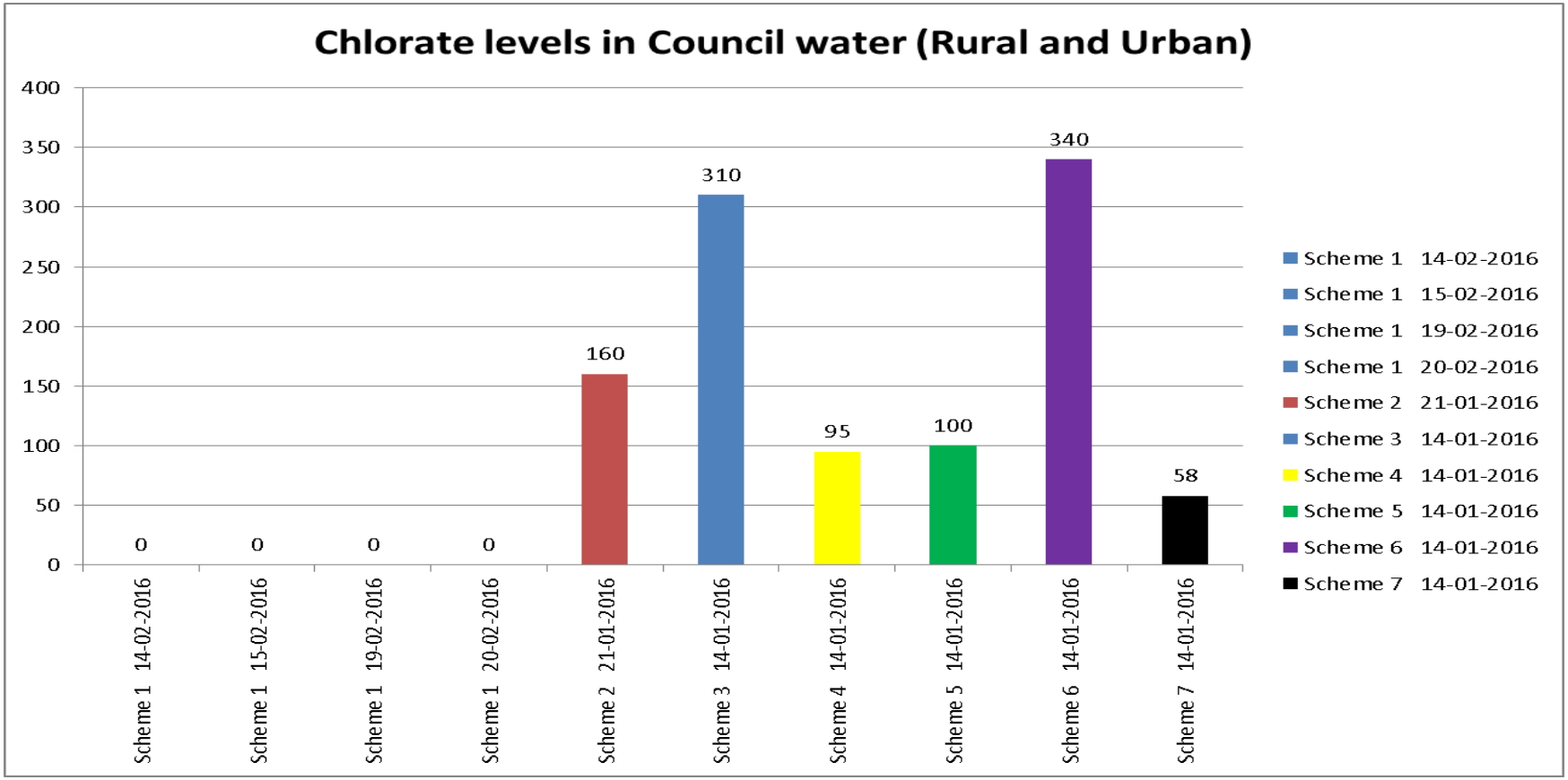
Detection limit = 0.50 mg/kg

Will chlorates be detected in milk powder if the milk TCM is close to the TCM limit (0.0015 mg/kg) - YES

Milk TCM (mg/kg)	Milk- chlorate (mg/kg)	Freeze dried Powder-chlorate (mg/kg)
0.0014	NDT	0.018 (18 ppb)

Detection limit = 0.01 mg/kg

Industry results --on chlorate levels in water schemes



Scheme 1 is on chlorine gas

Detergents used on farms

- **Sodium hypochlorite contains 8-10% chlorine & high chlorate**
- **It is not recommended as part of wash routines**
- **It is inappropriately used for cluster dipping, sterilising the plant, adding to other detergent steriliser products**
- **It is also used for sterilizing well water and group water schemes**

- **Sodium hydroxide/sodium hypochlorite contains 3.5% chlorine - recommended levels- much lower chlorate levels than hypochlorite products**
- **Some products have higher chlorine % (4 to 10%) and present advise is against using these products**
- **The age of the product will have an impact on the levels detected, levels higher one week after manufacture**

- **Sodium hydroxide contains chlorates -less than sodium hypochlorite**

Detergents -summary

- **Chlorate levels will be considerably lower when cleaning products are diluted with chlorine free water at recommended levels**
- **Its likely that all cleaning products contain chlorates**
- **Comparing products for chlorate levels is of little value as the levels will depend on the age of product, farm storage conditions, as well as the source of caustic & chlorine %**
- **Role of farm detergents just one part of the problem**

Summary

- Detection limit not adequate to detect chlorate levels in milk-even in high TCM milk samples-need a limit of detection of 0.0012 mg/kg
- Chlorates easily detected in milk powder
- Freeze drying does not cause development of chlorates (if not already present)
- High rates of chlorates detected in both chlorine and non-chlorine products
- Out of date products giving higher chlorate readings
- Chlorine gas treatment of water will remove chlorates-safety
- Milk samples at TCM limit (0.0015 mg/kg) can result in chlorates in milk powder over the chlorate limit (0.01mg/kg)

Thank you