

ADULTERATION  
SCREENING PACKAGE



## Overview on targeted models, description of adulterant and limit of detection

Contaminant	Description	Targeted LoD level (%)	MilkoScan LoD, %
Added urea	Added to milk to increase the apparent Kjeldahl protein content. Added to milk to mask the density change when water is added.	0.01-0.02	0.0250
Ammonium sulphate	Added to milk to increase the apparent Kjeldahl protein content. Added to milk to mask the density change when water is added.	0.005-0.01	0.0065
Cyanuric acid	Appears when melamine is used for adulteration.	0.001-0.003	0.0040
Formaldehyde	Added to milk to disguise poor microbiological quality.	0.07-0.08	0.0077
Glucose	Added to milk to mask the density change when water is added. Similar to other carbohydrates in food.	0.1-0.2	0.0480
Hydroxyproline	Added to milk to increase the apparent Kjeldahl protein content.	0.01-0.02	0.0131
Maltodextrin	Added to milk to mask the density change when water is added. Similar to other carbohydrates in food. Not a well-defined chemical compound.	0.4-0.6	0.0155
Maltose	Added to milk to mask the density change when water is added. Similar to other carbohydrates in food.	0.3-0.4	0.0390
Melamine	Added to milk to increase the apparent Kjeldahl protein content.	0.005-0.01	0.0074
Sodium bicarbonate	Added to milk to disguise poor microbiological quality.	0.03-0.05	0.0160
Sodium carbonate	Added to milk to disguise poor microbiological quality.	0.03-0.05	0.0060
Sodium chloride	Added to milk to mask the density change when water is added. The water spectrum is slightly sensitive to its presence.	>1%	0.0400
Sodium hydroxide	Appears in milk due to insufficient rinse after cleaning of equipment. The water spectrum is slightly sensitive to its presence.	>1%	0.0360
Sodium nitrite	Added to milk to increase the apparent Kjeldahl protein content.	0.002-0.005	0.0057
Sorbitol	Added to milk to mask the density change when water is added. Similar to other carbohydrates in food.	0.03-0.05	0.0250
Sucrose	Added to milk to mask the density change when water is added. Similar to other carbohydrates in food.	0.2-0.3	0.0219

## Milk adulteration

- Milk is the second most commonly adulterated food (after olive oil)
- Definition: The action of making something poorer in quality by the addition of another substance
- May be unintentional (e.g. cleaning agent, substance from cows' diet) or intentional (e.g. increase volume, fat, protein content for economic gain)



## Adulteration Screening using MilkoScan technology

- 1 untargeted model – allows to detect any adulterant affecting FTIR spectrum; high limit of detection
- 16 targeted models, see table for details – allowing to detect 16 different adulterations at low limit of detection
- Combination of untargeted and targeted models is the optimal solution for adulteration screening



## Units and limit of detection

- Untargeted model: a score is given to estimate adulteration level
- Targeted models: the concentration of the adulterant is estimated in %
- Limit of detection (LoD): samples with results above the LoD are to be considered positive
- False-positives: Given the MilkoScan technology, it is expected that 0.1% of samples (meaning 1 out of 1000 samples) marked as positive are wrongly marked as such – LoD could be adjusted to reduce the number of false-positive samples



## Concept of working with adulteration screening package

- MilkoScan technology allows inexpensive and efficient screening for adulteration in milk:
  - Selection of positive samples for confirmatory tests
  - Tracking of specific milk producers to see whether they show positive on regular basis
- Additional information to milk processors to be able to produce safer dairy products, possibly with new quality label, and ISO 22000, IFS Food standard, HACCP concepts in general)



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