Quality Management System and Inspection Requirements for Water used in the Food Industry

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This presentation.....

- Will focus on the use of water in the fresh produce sector (fruit and vegetables)
- Very importantly:
  - Historically, most of the food safety standards, e.g. SANS 10330, ISO 22000 and BRC focus on manufacturing / processing facilities
  - These establishments are in the MIDDLE of the food chain
  - Farm to fork or tree to table is the approach that should be adopted when looking at food safety control measures (farms can be a major source of contamination)
“Drivers” of food safety (water)

- Legislation
  - Consumer Protection Act
  - R146 – Labeling regulations
  - Retailers
  - Moral of the story – “due diligence is the name of the game”
References to control of water in Standards....

- GlobalGAP
  - Section 7 (Crops Base)
- TNC
  - Section 5
- SANS 10330: 2007
  - 6.2
- SANS 10049: 2011
  - 7.4.1
- ISO 22000: 2005
  - 7.2.3
- PAS 220
  - 6.2
- BRC Global Standard for Food Safety
  - 4.4.1 and 4.4.2
Extracts from QMS standards

- SANS 10330: 2007
  - 6.2: The PRPs shall as a minimum address the following:
    - i) services needed for production, for example, air, water;
    - The word water appears in the HACCP Standard a mere ONCE!!!

- ISO 22000: 2005
  - 7.2.3: The organisation shall consider the following when establishing these programmes (PRPs)
    - C) supplies of air, water, energy and other utilities
BRC Global Standard for Food Safety:

- 4.4.1: All water used as a raw material in the manufacture of processed food, the preparation of product, or for equipment or plant cleaning shall be supplied in sufficient quantity, be potable or pose no risk of contamination according to applicable legislation, either being drawn from mains supply or suitably treated according to its source
So, after carefully considering the standards we would obviously deduce the following:

- The clear lack of granularity (detail) with regards to a basket of control measures for ensuring water quality (including safety) means that water does not have to be taken seriously in a food safety system (HACCP / ISO 22000 etc)
WRONG !!!!!
Water is used for the following purposes in the food industry (primary production and manufacturing)

- Irrigation of crops
- Crop spraying
- Post-harvest chemical applications
- As an ingredient (raw material)
- For rinsing / post-harvest washing purposes
- For cleaning purposes
- For hand washing purposes
- In laboratories (growth media; autoclaves)
- Production processes, e.g. water transport flumes
- Cold storage – controlled atmosphere conditions
- Production of steam
- In fire hydrants
So, clearly, water is an intricate part of the food industry and sufficient and effective control measures are required.
Control of Water (Food Safety and quality)

Main “control measure”

- Testing of water for contamination
  - Risk analysis of water (very important yet very often totally discarded)
    - To determine frequency of testing
Water testing – SANS 241 – Potable water standard in South Africa

- Do a BASELINE water test
  - Microbiological analyses
    - Bacteria and parasites
  - Chemical analyses
    - Metals and heavy metals
  - Organoleptic tests
Factors to take into consideration with regards to the frequency of water testing:

- Cost implications
- Risk to business
- Rule of thumb: The higher the food safety risk of the product, the higher the frequency of water testing
Risk Analysis of Water
Location of farm / factory (faecal contamination)

- Urban vs rural
- Downstream from informal settlements
- Location of dams (at the bottom of hills) – contamination from cattle
- Topography of the farm
  - Orchards – runoff of chemicals from crop spraying programs in orchards
- Near industrial areas – serious risk of chemical contamination
Location

- Either Urban or Rural

Rule of thumb is the following:

- Municipal water in urban areas is often of a higher quality than municipal water in rural areas
- Rural municipal areas often do not have sophisticated methods of purifying water or there is a lack of technical expertise at purifying plants
- Chlorination will kill bacteria but is often not effective against certain parasites such as *Cryptosporidium* and *Giardia*
  - Survive as cysts in water which chlorine cannot penetrate
Source of water

- Municipal water (urban vs rural)
- River
- Borehole
- Dams – from irrigation scheme / runoff from mountains
Extrinsic parameters of the food product

- pH of the product
- Structural morphology of the food product
  - Oranges vs lettuce
    - Oranges have a thick skin
    - Lettuce has no skin
  - Raspberries / strawberries
    - Have hairs that can serve as a location for microorganisms to attach and proliferate
Type of irrigation

- Fruit grows in trees and vegetables in the ground
- Overhead sprinklers (raspberries with hair although low pH)
- Micro irrigation, drip and flood irrigation – all done at ground level, therefore water of poor quality has little effect on the food safety status of fruit
- Vegetables cultivation is in the ground or on the surface of the ground
  - Microbial contamination is therefore great with regards to irrigation
Does post-harvest washing / rinsing of products take place in a factory?

- Potable water at all times
- Will food product be cooked after harvesting? (water of lower quality can be used for irrigation purposes)
- Will food product be eaten fresh (raw)?
- Will food product be used as a raw material to be used in a food product that will eventually be cooked?
Use of laboratories for doing analyses
Accredited vs Non-accredited laboratories

- As far as possible – use accredited laboratories
- Have ISO 17025 accreditation under SANAS (South African National Accreditation System) or other accreditation body under the IAF
- Check schedule of accreditation – very important (lots of fraud)
- [www.sanas.co.za](http://www.sanas.co.za) – go to “Accredited Facilities” and find the laboratory
The laboratory test report must carry:

- SANAS logo
- Designated laboratory number, e.g. T0312
Non-accredited facilities

- This will occur more in rural areas
- Determine if laboratory is involved in an Interlab / Ring accuracy testing scheme
- Get confirmation in writing
Other factors to take into consideration with regards to the safety of water
- Internalisation of water
  - E.g. Warm water in cold wash water
  - Temperature differential of 10-12ºC
  - Cold water diffuses through the skin of the tomato (contamination of water presents a problem)
Addition of chemicals to water

- For post-harvest sanitation purposes
- Disinfection
  - Read the LABEL properly and comply with the label instructions with regards to the CORRECT dosage
  - Check conversions and extrapolations (check decimal points)
Chemicals that can be used in the food industry to sanitize water (on-site):

- Must be SABS 1853 approved (be careful, not SABS 1828)
- Chlorine – very effective and the cheapest
  - Corrosive, therefore high maintenance costs
  - Occupational health and safety hazard
  - Some importing countries do not allow the use of chlorine as a sanitizer – Scandinavian countries
- Chlorine dioxide
  - Harvest wash
- QACs (Quartenary Ammonium Compounds)
  - Sporekill
  - Terminator
  - Quatrokill
  - Desogerm
- Ozone
- UV lights
Systemic and Contact Applications
GlobalGAP requirement

- Water used for spraying crops must be of a potable water source
A common question often encountered in the implementation of Food Safety systems

- Is water a PRP or can it be considered a CCP under the umbrella of the HACCP system?
Remember:
- If you want a CCP, validation and verification of the CCP must be done
- Keep water a PRP – SANS 10049 and SANS 10330
- Don’t make water a CCP because it looks better to have more CCPs
Thank you !!!