CFA/055a/20

BY EMAIL:
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22 May 2020

Mr Russell Wedgbury
Operational Policy:
PPP
Chemical Regulations
Division
HSE

Food & Biocides Industry Group

www.chilledfood.org/FBIG

Dear Russell,

Chlorate MRL Compliance

The Food & Biocides Group (FBIG, www.chilledfood.org/FBIG) represents the entire food chain from farm to final consumer, comprising some 20 UK trade and professional organisations.

Thank you for playing such a major role in securing improvements to the proposed EU chlorate MRL legislation, although we and the rest of the food industry internationally maintain our position that PPP legislation such as 396/2005 is a wholly inappropriate regulatory tool for dealing with traces arising from the legally-required use of hygiene biocides to assure water and food safety.

Thank you for also now following up on our requests since last autumn to work together on a rational enforcement approach on proposed new MRLs for chlorate, and particularly the 'processed' foods element in Footnote A.

The food industry manages risk using proactive HACCP-based food safety management systems rather than relying on reactive Quality Control approaches. In this response to your request for suggested approaches to confirming compliance with the proposed EU chlorate MRLs we set out sources of contributions to chlorate traces in food and drink, best practice data and considerations in the employment of generic information on levels of chlorate in mains water.

1. Sources of Chlorate in Food and Drink

Sources of chlorate in food and drink are well understood. Chlorate arises in food and drink primarily from the use of hygiene biocides by water companies to assure the safety of mains water. It is the responsibility of water companies to supply water of appropriate quality to their customers from all their water treatment works (WTWs).

As the Pesticides Residues in Food Expert Committee (PRiF) recognises[1], chlorate is "... *unavoidable and important for the maintaining of microbiological control vital for food safety...*"

Contrary to the statement in para 14 of your letter[2], mains water is used in the field for crop irrigation and for hydroponics, and post-harvest for transport (flumes), cooling, for produce washing (often with the addition of hypochlorite by FBOs to assure produce washwater hygiene), as a food ingredient, for cleaning and disinfecting food equipment and utensils, pipework associated with the production, transport storage or consumption of food or feed for humans and animals, and for washing hands.

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[1] PRiF **Q3 2019 report**.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879216/prif-monitoring-2019-quarter3.pdf

[2] "*14. However, in the case of chlorate, the residue does not arise at the early stage of food production*". HSE letter to food industry 21/4/20

There is clear evidence[3] that chlorate bioaccumulates in produce during growth, when plants take up water. This is a natural, irreversible mechanism. UK fruit and vegetable growers are aware that chlorate accumulates in fresh produce during growth, when crops are irrigated or hydroponically grown with water that has been treated with chlorine compounds (e.g. from WTWs, municipal water, private boreholes), to make it safe to use, so that produce is safe to eat. Chlorate ions in the water are absorbed via plant roots and bound or locked-up within plant foliage. Such bound chlorate cannot be removed during further processing.

Fresh produce also picks up, externally, chlorate from equipment and surfaces that have been disinfected with chlorine-based compounds. The fate of this externally attached chlorate is unknown as this is dependent on management of the final product, e.g. packed in the field, further processed.

The AHDB submitted chlorate (and perchlorate) in fresh produce data from growers to the Chemicals Regulation Directorate and the Food Standards Agency in October 2015, February 2016 and in November 2018. The majority of the submitted data was on levels found in fresh fruit and vegetables, at harvest or at the point of despatch, before any further processing. Although data pertaining to specific crops was limited, crops such as spinach and herbs tended to have greater amounts of chlorate than e.g. wholehead lettuce, suggesting species and most probably varietal differences, in how different fruit and vegetables bioaccumulate chlorate, during growth. AHDB are aware that much work has been done by individual grower businesses and Producer Organisations to mitigate this, but bioaccumulation cannot be prevented.

AHDB continues to work with growers to help them to reduce chlorate levels in fruit and vegetables. In 2016 AHDB published a review[4] on the sources of chlorate and perchlorate in fresh produce with grower action points on how to mitigate against MRL exceedances.

AHDB hosts annual events, including training workshops, technical seminars and webinars, to disseminate knowledge on the subject. In 2019 one webinar topic[5] focussed on the challenges of chlorate testing because of grower concern that different laboratories where giving different test results, for the same samples.

Growers were losing confidence in the chlorate test results that they were getting from the different ISO accredited labs. AHDB funded a very small chlorate in tomato testing study, to find out how variable the results from different laboratories were. The results confirmed that there is variability in reported results for the same samples, but the results were not statistically significant.
Despite this, it is important to note that a small difference between two reported results could mean that one result complies with an MRL yet the other does not; there still remains grower concern as regards the differences.

On 18 February 2020 AHDB hosted a grower event where a presentation on how to mitigate against chlorate MRL exceedances was given[6].

Such presentations, including others that pertain to irrigation water management, e.g. on the importance of biofilm removal in irrigation pipework, are available on the AHDB website, to help fresh produce growers to mitigate against chlorate MRL exceedances in fresh produce.

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[3] AHDB (2016). **Chlorine and its Oxides – Chlorate & Perchlorate Review.** Report CP154a. https://ahdb.org.uk/cp-154a-chlorine-and-its-oxides-chlorate-perchlorate-review

[4] AHDB (2016). **Chlorine and its Oxides - Chlorate & Perchlorate Review**. Report CP154a. https://ahdb.org.uk/cp-154a-chlorine-and-its-oxides-chlorate-perchlorate-review

[5] Gil Chlorate testing_1.pdf

[6] Mabel_chlorate mitigation strategies.p

Kettlitz et al (2016[7]) reviewed the origin of chlorate found in foods, collating chlorate data on more than 3,400 samples of mainly prepared foods, including dairy products, meats, fruits, vegetables and different food ingredients/additives. In total, 50.5% of the food samples contained chlorate above 0.01 mg/kg, albeit not due to the use of chlorate as a pesticide but mainly due to the occurrence of chlorate as an unavoidable disinfectant by-product, including in irrigation water, flumes, cooling, washwater, direct incorporation as an ingredient, and from equipment surface decontamination. A further entry point of chlorate into foods may be via additives/ingredients that may contain chlorate as a by-product of the manufacturing process (e.g. electrolysis). Of the positive samples in their study, 22.4% revealed chlorate above 0.1 mg/kg. They confirmed that the presence of chlorate traces in both potable water and on food commodities which are rinsed, sprayed, washed or cooled with potable water is therefore a consequence of water disinfection via oxyhalides.

Currently there is no prescribed maximum value for chlorate in potable water in the UK. There is therefore limited data from water companies on chlorate levels. However, a 2019 report[8] commissioned by the Drinking Water Inspectorate from the Cranfield Water Science Institute regarding chlorate in water from treatment companies in England and Wales, found no exceedance of the WHO guideline level for chlorate in drinking water of 0.7mg/l, but 23.5% of the samples tested exceeded the 0.25mg/l level in the new Drinking Water Directive proposal. The method of water disinfection has an impact on the level of chlorate present with on-site electrolytic chlorination and sodium hypochlorite giving the greatest risk of elevated chlorate levels. Sodium hypochlorite decomposes over time leading to the formation of chlorate. This decomposition is unavoidable but good housekeeping practices by WTWs can minimise the amount of chlorate.
We request that HSE liaises with water companies directly on this matter to ensure that mitigation measures are in place.

Chlorate concentrations in mains water were also shown to be seasonal with the highest levels occurring between June-September.

This notably coincides with the bulk of the UK's salad crop production season.

Water companies should be required to monitor chlorate at their WTWs, and make their data available to HSE, DWI and FBOs, even if the UK chooses not to implement the recast Drinking Water Directive.

There are 600,000 FBOs in the UK, all using water in their businesses. It would be not only disproportionate to try to shift responsibility for assuring the quality of water supplied to them onto them, but also impractical given that there are no rapid methods for chlorate analysis, analytical methods for high protein, carbohydrate, fat or composite foods have not been validated, basic tests take several days for turnaround and are costly. There is however a small number of water companies and they are required to supply water that is fit for purpose. They should share with their customers and the Government and its agencies data demonstrating that they are doing so.

2. <u>The Hygiene/Food Safety Imperative</u>

Chlorate is not used as a PPP. Good Agricultural Practice (GAP) compliance is part of FBOs' Food Safety Management Systems to assure chlorate is not used as a PPP.

Cleaning agents are used throughout the food supply chain, from hand washes in the field, cleaning lines in the packhouse, in food production operations, and on retail shelves to prevent microbiological contamination.

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[7] Beate Kettlitz, Gabriella Kemendi, Nigel Thorgrimsson, Nele Cattoor, Ludovica Verzegnassi, Yves Le Bail-Collet, Farai Maphosa, Aurélie Perrichet, Birgit Christall & Richard H. Stadler (2016): **Why chlorate occurs in potable water and processed foods: a critical assessment and challenges faced by the food industry, Food Additives & Contaminants: Part A**, DOI: 10.1080/19440049.2016.1184521
[8] Cranfield Water Science Institute (2019). **Chlorate in Drinking Water**, Defra WT2209 (DWI70/2/316). http://www.dwi.gov.uk/research/completed-research/reports/DWI70-2-316.pdf

Chlorine-based disinfectants have a proven track record over many years and the UK food industry has an excellent public health record with current practices which must be maintained.

The potential entry points for chlorates are understood and are widespread in the supply chain for fresh fruit and vegetables and other foodstuffs, even before products reach the final stage of preparation by the customer in a food outlet or in the home.

For example, EU guidance on addressing microbiological risk in fresh fruits and vegetables at primary production through good hygiene includes innumerable references to using potable water at different stages of production as part of a good hygiene regime:

- Risk evaluation considering source and intended use of water, recommended limits for contamination
- Regulation (EC) No 854/2004 Annex I – Par A – II.5 (c) obligations: 'FBO producing or harvesting plant products are to take adequate measures, as appropriate, to use potable water, or clean water, whenever necessary to prevent contamination'.
- Point 7.3.4.1 (f): 'Water delivery systems including basins, tanks and storage of water sources should be maintained and cleaned appropriately, to prevent microbial contamination of water and biofilm formation.'
- Higher quality of water recommended for overhead irrigation
- Water used in hydroponic culture should be changed frequently or if recycled should be treated to minimise microbial contamination.
- Importance of washing fresh produce to reduce overall potential of microbial food safety hazards. Water used for final rinses should be of potable quality if ready to eat products.
- Only potable or disinfected water should be used for initial water as transport-sorting water for apples, pears…. Hand washing and rinsing harvesting equipment when handling crops that might be eaten raw.
- Recognises use of biocides to disinfect surfaces, material, equipment used for washing, rinsing, cooling.
- Clean and disinfect water contact surfaces such as dump tanks, flumes, wash tanks and hydro coolers as often as necessary to ensure the safety of produce.
- Additional good practice for leafy greens, tomatoes etc referred to.
- Workers: wash hands; clean gloves if reusable.
- Clean and where necessary disinfect facilities, equipment, containers, crates, vehicles.
- Washing of berries intended for freezing in potable or chlorinated water.
- Clean and disinfect harvesting equipment.
- Use of potable water for ice and hydro coolers where used to precool berries after harvest.
- Use of potable water – 'can be used without any restrictions and without analysis.'

3. EU Definition of 'Processed'

The EU (Regulation 852/2004) refers to fresh fruit and vegetables which are **washed, sorted and packed** as being '**minimally processed'.** Footnote A does not reflect this fully.

Two examples of such products which are legally categorised as minimally processed are given below and a further (pre-washed leafy salad) is at Appendix 1.

Note that Good Agricultural Practice (GAP) compliance is part of FBOs' Food Safety Management Systems to assure chlorate is not used as a PPP.

a) Sprouted seeds

Concerns have been raised about the ability to maintain food safety for sprouted seeds, cress and shoots. EU legislation requires the analysis of sprouted seeds for six STEC serotypes (O157, O145, O111, O103, O26 and O104:H4) prior to release onto the market.

There are four stages where chlorine could be used as a biocide/disinfectant:

1. In mains water for use in irrigation
2. To decontaminate irrigation water
3. To disinfect seed pre-germination
4. As a product wash disinfectant (together with citric buffer) of finished product.

The Fresh Produce Consortium produced guidelines[9] for food business operators on the hygienic sourcing, production and safe handling of ready to eat sprouts in consultation with the Food Standards Agency. Specific steps detail the initial rinse and the use of anti-microbial treatments for sprout production. The recommendations for seeds are that they are rinsed and agitated in large volumes of potable water until dirt is removed and antimicrobial treatments should be used that can achieve at least a 3-log reduction of microbial pathogens. The guide cites examples of 2,000 ppm of calcium hypochlorite or sodium hypochlorite for 15-20 minutes or 6-10% hydrogen peroxide for 10 minutes. It also details that a rinse is necessary following the antimicrobial treatment and recommends analysis of the spent irrigation water and the finished product.

b) Cherry Production

The post-harvest handling of fresh cherries involves the use of large volumes of chlorinated water. If the amount of chlorine used in the water for hydro-cooling and water flumes in the pack houses has to be reduced then there will be a significant risk of micro-biological contamination which will be spread throughout the crop by contaminated water. This will certainly involve increased fruit spoilage through the failure to control fungal spores but more importantly there is a risk of food poisoning organisms (*E. coli* from birds for instance) being spread through the fruit. Water circulated in pack houses is normally filtered but only to reduce the physical contamination.

4. Further Food Production Examples

The appendices to this document illustrate sources of chlorate and their management in key food production examples:

1. Prewashed bagged/leafy salad
2. Fruit juice and soft drinks
3. Cured meat
4. Dried milk products
5. Chicken salad sandwich

5. Best Practice Baselines

We have as FBIG and individual organisations since 2014 provided data to HSE on levels of chlorate occurring in foods, and have developed guidance at UK[10] and global[11] level on minimisation of traces of hygiene biocides and their derivatives in foods from farm to final product.

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[9] FPC (2013). **Guidance for food business operators on the hygienic sourcing, production and safe handling of ready to eat sprouts.** Second Edition. https://www.freshproduce.org.uk

[10] FBIG (2016), **Biocides in Cleaning & Disinfection.** https://www.chilledfood.org/wp-content/uploads/2018/08/Biocides-Cleaning-and-Disinfection-working-document-industry-guidance-18-10-16-with-updated-best-practice-example-FBIG-logo-in-progress.pdf

[11] GFSI (2019). **Chemicals in Food Hygiene. Volume 1: The optimal usage of cleaning agents, sanitisers and disinfectants to minimise the risk of traces in foods.** https://www.mygfsi.com/files/Chemicals_in_Food_Hygiene_Volume_1_FINAL.pdf

For example, to minimise chlorate arising in hypochlorite:

1. Buy NaOCl with low as possible levels of chlorate (<1.5 mg/l)

2. Store correctly:
   - In the dark
   - In the cool (at 5°C degradation to chlorate in the absence of heavy metal contamination is very limited. Every 10°C increase increases degradation rate 3-4 fold)
   - Note degradation is increased when the initial solution is more concentrated (at 20°C 12.5% solution degrades to 10% in 100 days).
   - Store in UPVC reinforced with glass fibre reinforced polymer (GRP) resin or a full post cured vinylester GRP laminate.

3. Do not add new NaOCl to old as this promotes chlorate formation.

4. Reduce the level of suspended solids to nearly undetectable levels to significantly reduce degradation.

The fresh produce sector and food industry more widely, uses HACCP as part of their Food Safety Management Systems (FSMS), with Good Agricultural Practice (GAP) compliance being part of e system to assure chlorate is not used as a PPP.

However, as referred to earlier, there is clear evidence that chlorate bioaccumulates in produce during growth, when plants take up water. AHDB and industry data submitted to UK regulators includes that on chlorate in fresh produce at the point of harvest, before further processing. **These data, and those collected by PRiF for field-packed produce, are therefore pre-processing baseline data.**

The UK pesticides monitoring programme publishes quarterly reports as well as findings from a rolling reporting programme[12]. PRiF, responsible for the surveillance of food and drink on the UK market, has included findings for chlorate residues in a wide range of food and drink, including processed products on the UK market. **These data are a benchmark for typical levels being found in food and drink on the UK market when best practice mitigation is in place.**

PRiF states[13]: "*we are confident that the residues we are detecting come from use of chlorine-based disinfectants used to maintain microbiological safety (control microorganisms that cause food poisoning). Because these residues are unavoidable, and important for the maintaining of microbiological control vital for food safety, we are not treating these results as breaches of the MRL.*"

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[12] https://www.gov.uk/government/collections/pesticide-residues-in-food-results-of-monitoring-programme

[13] PRiF, **Q3 2019 Report**. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879216/prif-monitoring-2019-quarter3.pdf

6. Conclusions

Chlorate sources are well understood and derive primarily from potable water supplied by WTWs, the chlorate levels varying by treatment and season.

Mitigations by the food industry have been in place for several years, where feasible, but natural, irreversible bioaccumulation by crops in the field from irrigation water/hydroponics is a natural phenomenon.

PRiF data reflects best practice and seasonality, and these should be used as reference values.

The food industry will not compromise food hygiene and safety, and will continue to use hygiene biocides in a responsible manner.

We request that:

- Water companies are engaged by HSE, DWI and Government more widely and are required to share chlorate data including with FBOs to demonstrate water they supply is fit for purpose
- HSE liaises with water companies directly to ensure that mitigation measures are in place
- HSE acknowledges the natural phenomenon of bioaccumulation in fresh produce before processing
- HSE acknowledges mitigation measures in place in the food industry from farm to final product
- PRiF data are recognised as reference values when best practice is in place, i.e. chlorate is arising from use of hygiene biocides for legitimate reasons, as referred to in Footnote A
- Government more broadly works with the common aim of actively supporting maintenance of food hygiene and safety measures

We look forward to further engagement with you. Please let us know if you have any questions.

Yours sincerely,

K. Goodburn

KARIN GOODBURN MBE
Chair – FBIG, Director General – Chilled Food Association

British Association of Chemical Specialities

British Sandwich Association

British Soft Drinks Association

British Specialist Nutrition Association

Dairy UK

Food & Drink Federation

Fresh Produce Consortium

National Farmers Union

Provision Trade Federation

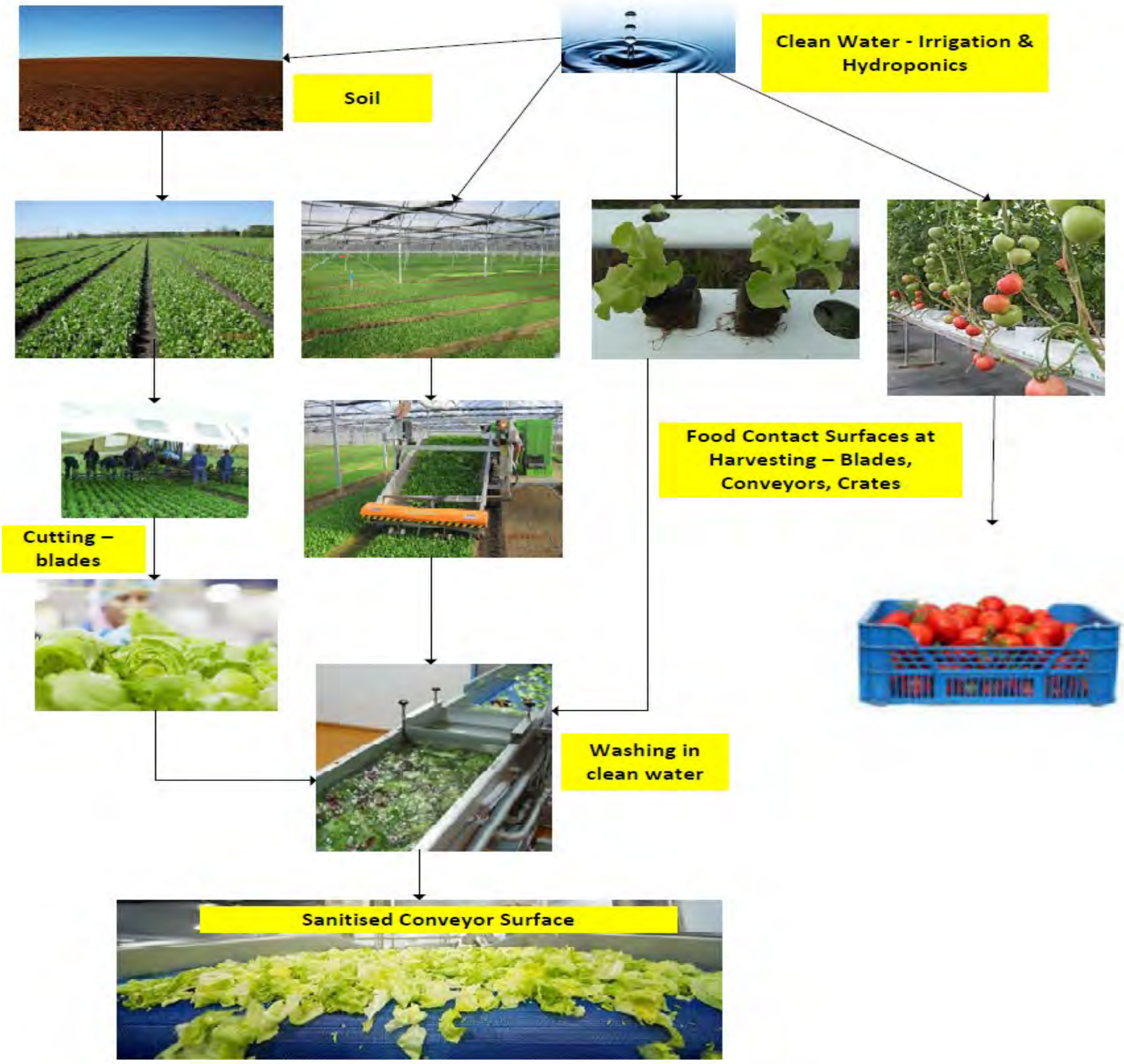
Society of Food Hygiene Technology

Appendix 1 **Prewashed Bagged/Leafy Salads**

Chlorates are not used as phytopharmaceuticals/PPPs. Good Agricultural Practice (GAP) compliance is part of FBOs' Food Safety Management Systems to assure chlorate is not used as a PPP.

Sources of chlorate traces in components and the final product are:

- Water for irrigation (or hydroponics) and as a disinfectant and sanitiser solvent
- Food contact surface disinfectants and sanitisers



For producers further chlorinating their wash water the level of chlorate present in the water may fluctuate based on a number of factors, in addition to the fluctuating level already present in the incoming mains water.

Industry guidance (FBIG, 2016 and GFSI, 2019) sets out measures to minimise chlorate in hypochlorite.

FBIG's member associations provide supplementary guidance[14],[15] to their members to assist in minimising chlorate in produce washing systems.

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[14] CFA (2010). **Protocol for produce washing.** https://www.chilledfood.org/wp-content/uploads/2015/09/CFA-56-10-Produce-Wash-Protocol-revised-11-5-10-final.pdf

[15] CFA (2010). **Produce Decontamination Assessment Protocol: Part 2 – Washing Validation**. https://www.chilledfood.org/wp-content/uploads/2016/11/CFA-55-10-Produce-decontamination-assessment-protocol-part-2-washwater-validation-revised-11-5-10-final.pdf

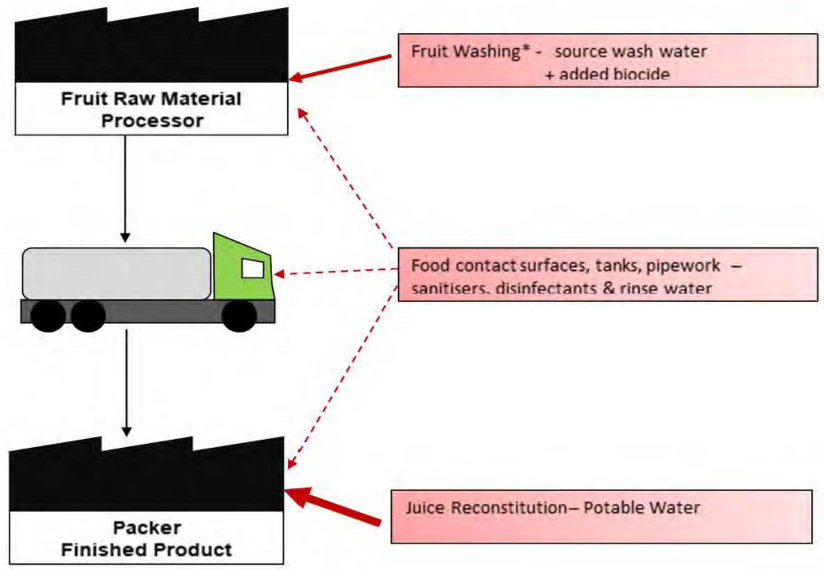
Appendix 2 **Fruit Juice & Soft Drinks**

Chlorates are not used as phytopharmaceuticals/PPPs. Good Agricultural Practice (GAP) compliance is part of FBOs' Food Safety Management Systems to assure chlorate is not used as a PPP.

Sources of chlorate traces in components and the final assembled product are:

- Water – an ingredient in components, disinfectant and sanitiser solvent
- Food contact surface disinfectants and sanitisers

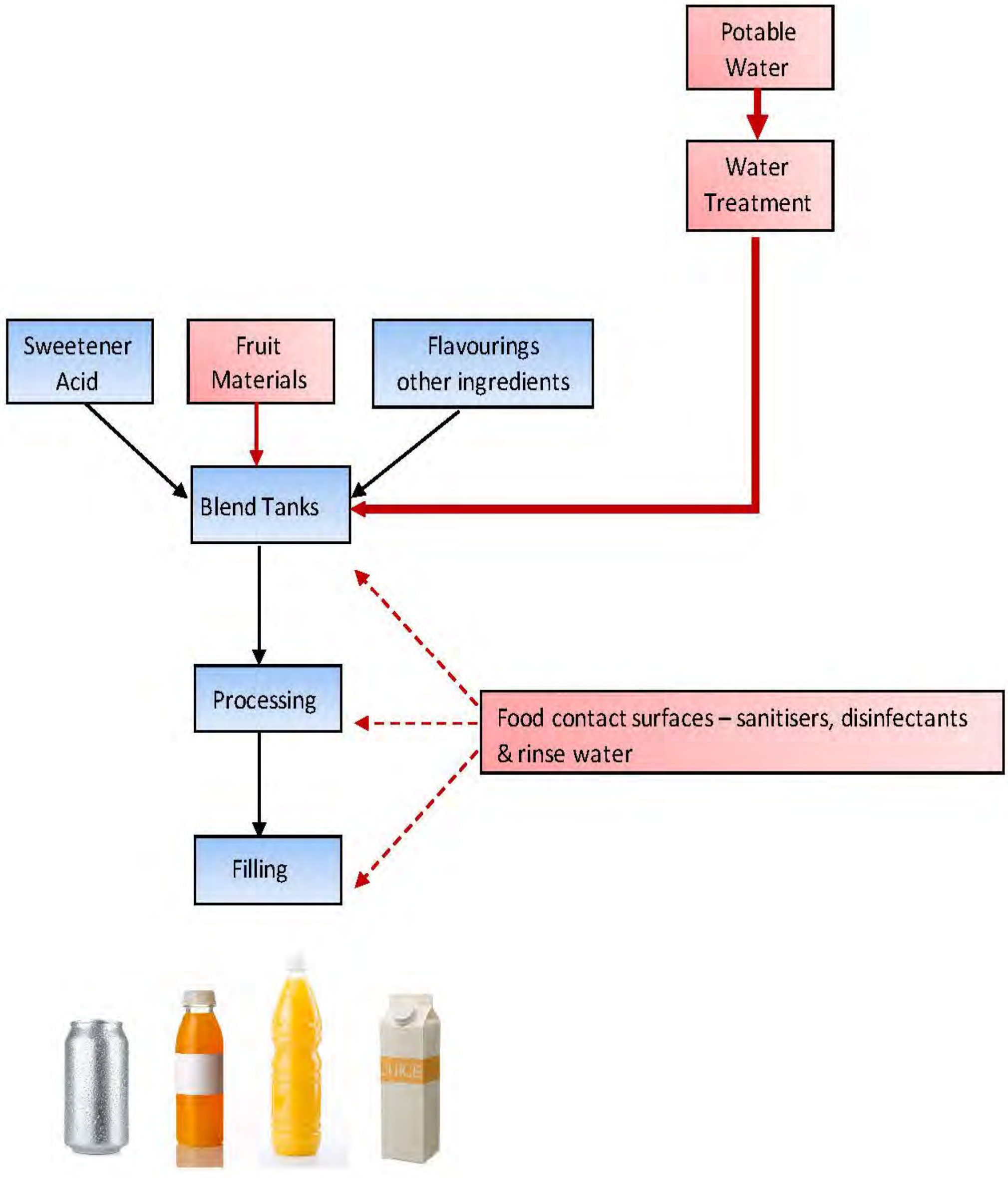
Key sources leading to elevated chlorate levels in fruit juices from concentrate



Potential inputs of chlorate shown in red

*The fruit washing stage becomes more significant depending on the type of fruit. Where the whole fruit is used for juice extraction, e.g. apple & soft fruits, the potential for chlorate increases.

Key sources leading to elevated chlorate levels in Soft Drinks



Potential inputs of chlorate shown in red

Appendix 3. Cured Meat[16]

Chlorates are not used as phytopharmaceuticals/PPPs. FBOs' Food Safety Management Systems assure chlorate is not used as a PPP.

Curing is the addition of curing salts to meat.

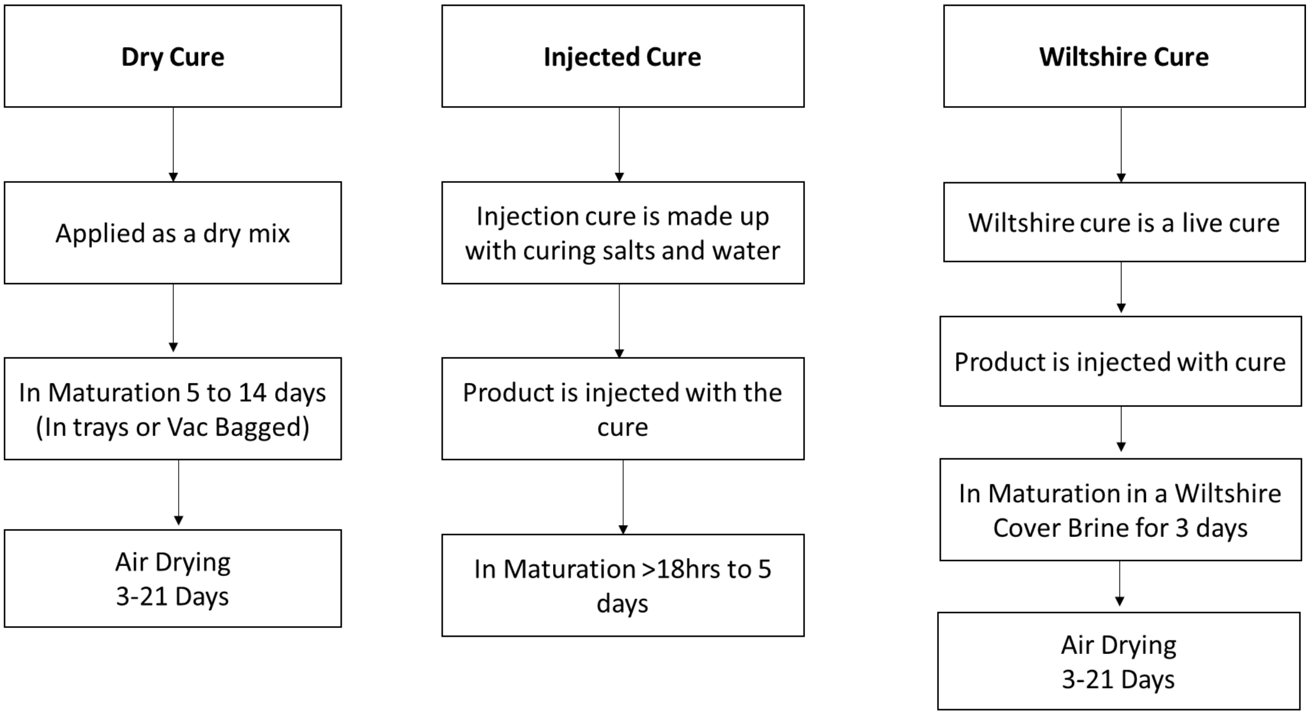
Curing salts are as a minimum sodium chloride plus sodium or potassium nitrite (usually sodium nitrate), optionally with materials added primarily for flavouring.

Curing salts can be added as a solution (brine) made up with potable water (wet cure), or applied as a dried mix (dry cure).

Sources of chlorate traces in components and the final assembled product are:

- Water – as an ingredient in components, disinfectant and sanitiser solvent
- Food contact surface disinfectants and sanitisers
- Animal feed and drink – from water as a component, contact surface disinfectants and sanitisers

There is a wide variety of cured meat products, e.g. bacon, gammon and ham, being produced by different methods, as shown below:



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[16] BMPA (2019). **Quality Assured Ham and Cooked Pork**, Doc. Ref. OM-3-2, 18/6/19

Curing methods include:

Injection of curing salts solution (curing salts in potable water)	
Immersion in curing salts solution (made with potable water), e.g. Wiltshire ham	
Dry-curing (application of curing salts in dehydrated form), e.g. dry-cured ham or bacon	

The type of brine and cure is otherwise determined by the technological and organoleptic requirements of customer specification.

However, certain process methods and cures may only relate to specific types of cured meats.

Uncooked cured meats such as wet-cured bacon typically contain 10% added water. The water-holding capacity of meat varies resulting in variation in the amount of added water retained.

Curing processes are controlled according to documented production procedures, specifications, brine make-up recipes, and monitored using chemical analysis and batch processing records, e.g. salt and temperature for curing brines.

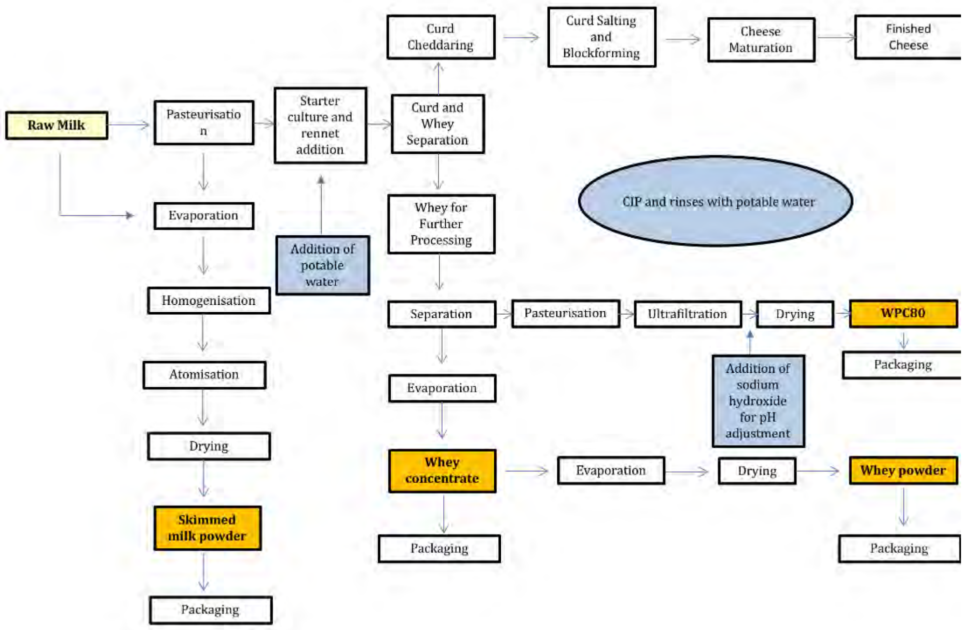
Chlorate levels will vary according to the source of meat, the quality of potable water used to make up brine, and the curing process used.

Appendix 4. **Dried Milk Products**

Chlorates are not used as phytopharmaceuticals/PPPs. FBOs' Food Safety Management Systems assure chlorate is not used as a PPP.

Sources of chlorate traces in components and the final assembled product are:

- Water – water consumed by cattle, an ingredient in components, disinfectant and sanitiser solvent
- Food contact surface disinfectants and sanitisers
- Use of sodium hydroxide for pH adjustment
- Animal feed and drink – from water as a component, contact surface disinfectants and sanitisers



Appendix 5. Chicken Salad Sandwich

This is an example of one of the ~15,000 SKUs of chilled prepared foods on the market every day in the UK. Chilled prepared foods are characterised by primarily being multicomponent and relying on scrupulous hygiene from farm (ingredients) to intermediate processor (e.g. mayonnaise producer, cooked chicken producer) to final assembler. Some chilled prepared foods can contain as many as 30 ingredients.

This is a Processed food, Footnote A applies.

Chlorates are not used as phytopharmaceuticals/PPPs. Good Agricultural Practice (GAP) and animal husbandry compliance is part of FBOs' Food Safety Management Systems to assure chlorate is not used as a PPP.

Sources of chlorate traces in components and the final assembled product are:

- Water – an ingredient in components, disinfectant and sanitiser solvent
- Food contact surface disinfectants and sanitisers
- Animal feed and drink – from water as a component, contact surface disinfectants and sanitisers

The manufacture of each of the components, and the final assembly contributes to the final level of chlorate traces present:

- Bread
- Butter (or margarine)
- Produce, e.g. vegetables, herbs
- Cooked chicken
- Dressings

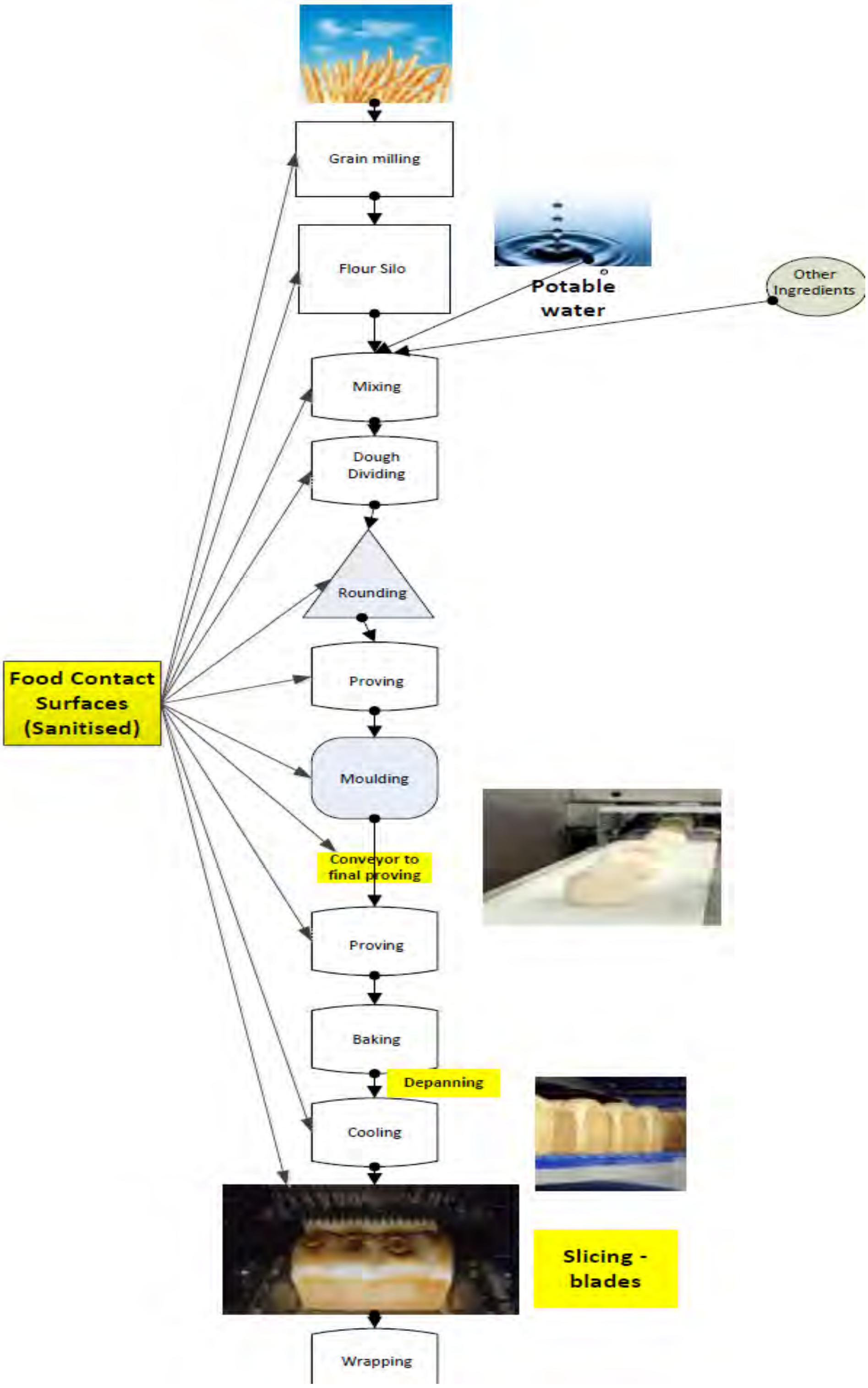
Taking each in turn:

Bread Manufacture:

Chlorates are not used as phytopharmaceuticals/PPPs. Good Agricultural Practice (GAP) compliance is part of FBOs' Food Safety Management Systems to assure chlorate is not used as a PPP.

Sources of chlorate traces are:

- Water in crop irrigation, as an ingredient, disinfectant and sanitiser solvent
- Food contact surface disinfectants and sanitisers

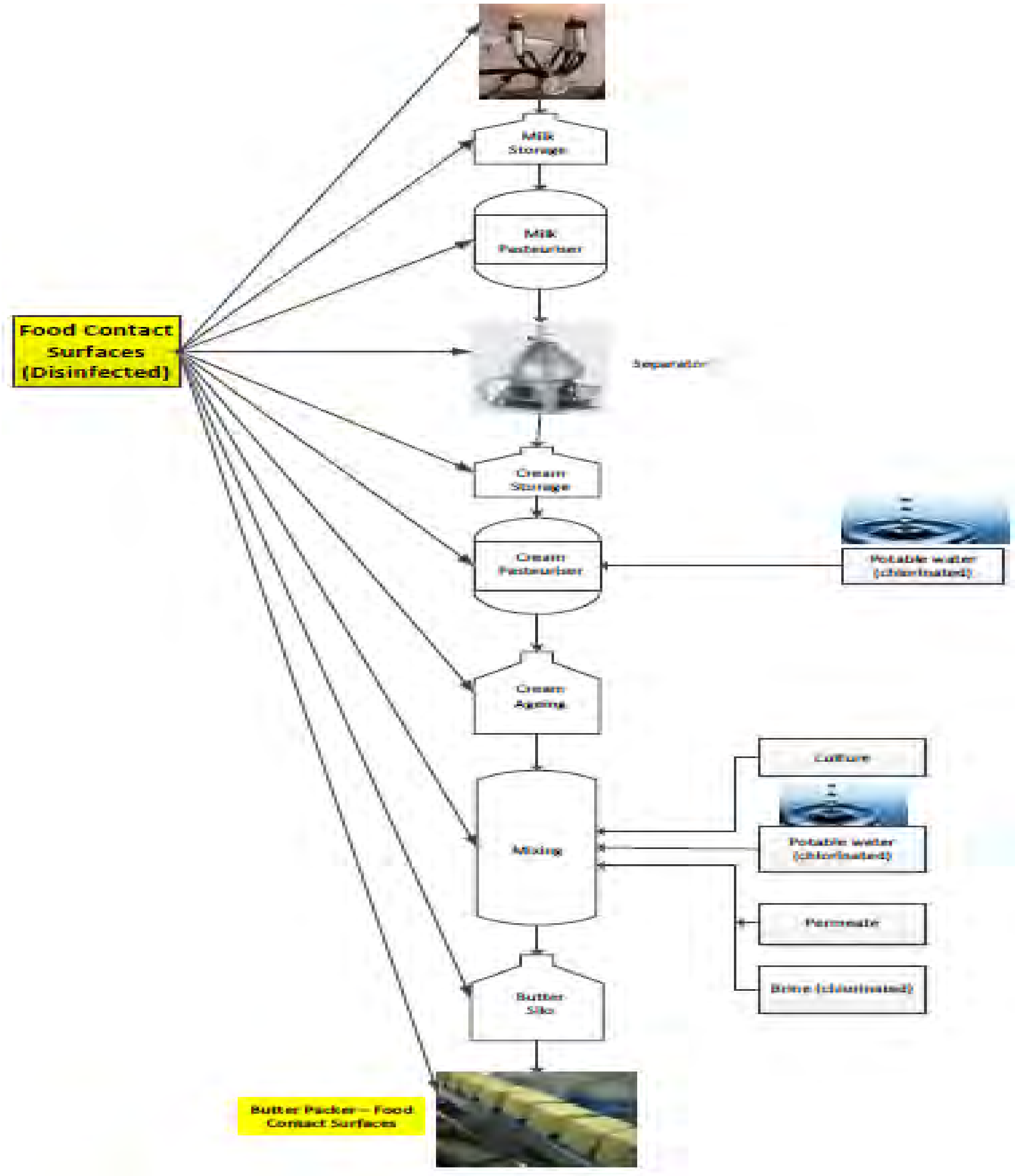


Butter Manufacture:

Chlorates are not used as phytopharmaceuticals/PPPs. FBOs' Food Safety Management Systems assure chlorate is not used as a PPP.

Sources of chlorate traces are:

- Animal feed – from water as a component, contact surface disinfectants and sanitisers
- Water as an ingredient in components, disinfectant and sanitiser solvent
- Food contact surface disinfectants and sanitisers

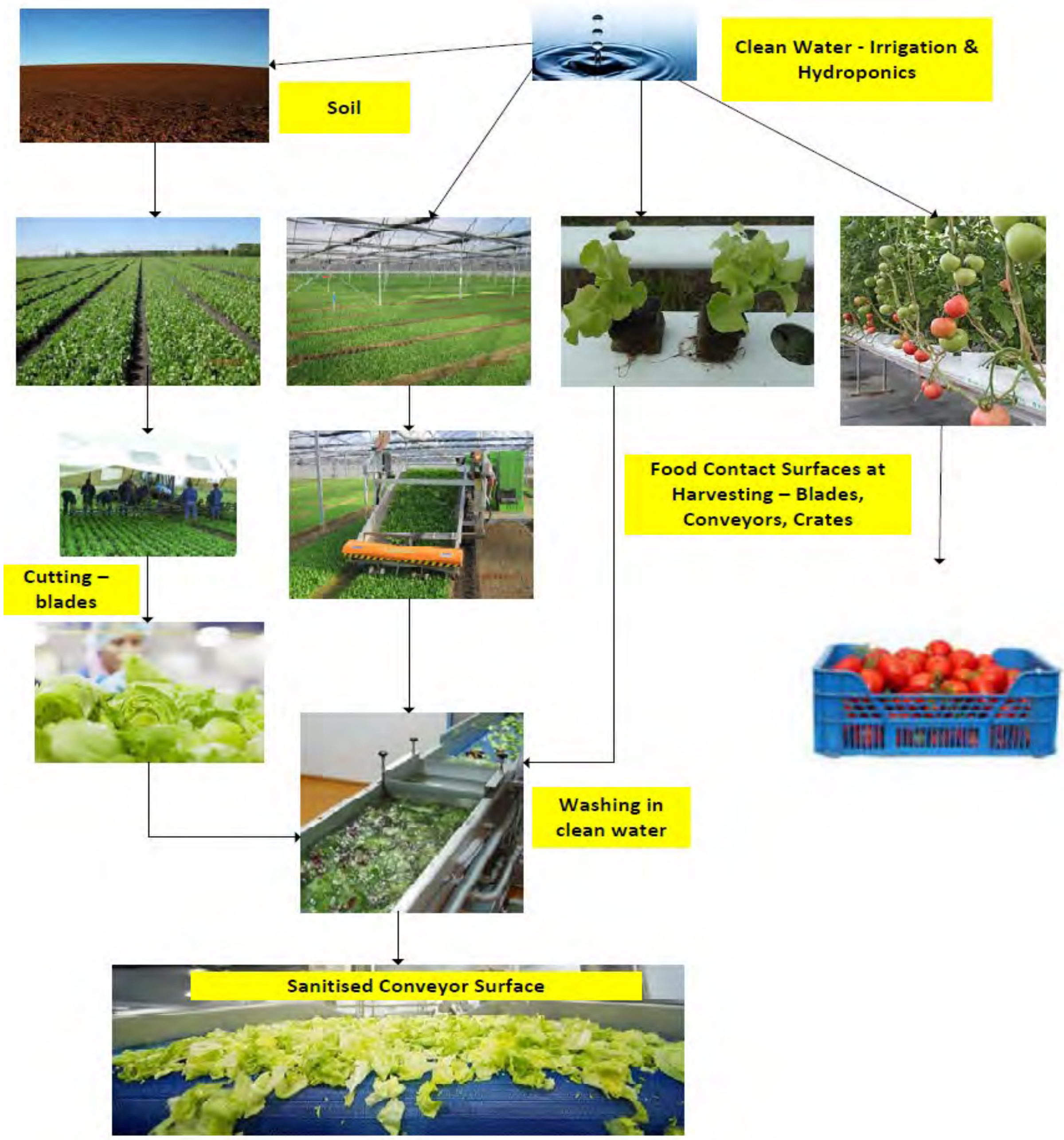


Fresh produce components:

Chlorates are not used as phytopharmaceuticals/PPPs. Good Agricultural Practice (GAP) compliance is part of FBOs' Food Safety Management Systems to assure chlorate is not used as a PPP.

Sources of chlorate traces in components and the final product are:

- Water for irrigation (and hydroponics), flumes, washwater, as a disinfectant and sanitiser solvent
- Food contact surface disinfectants and sanitisers

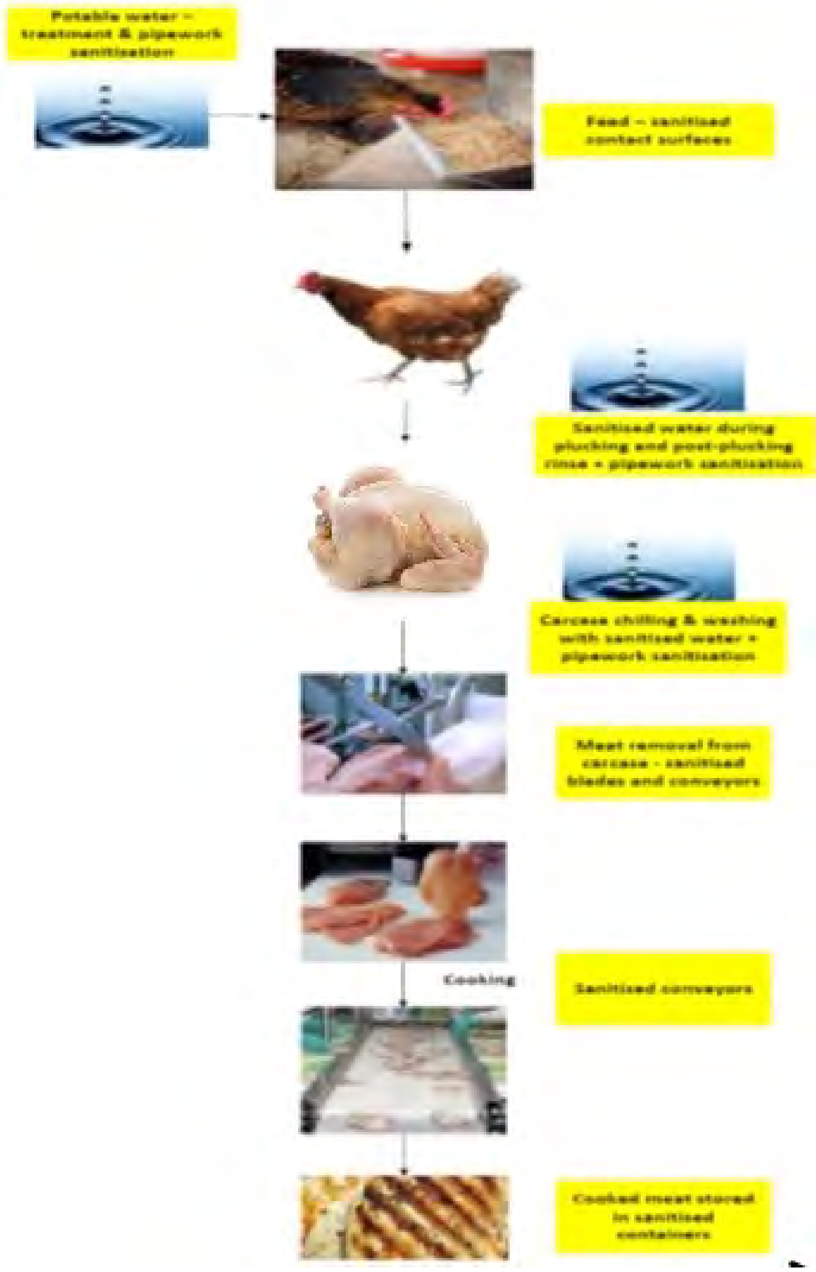


Chicken:

Chlorates are not used as phytopharmaceuticals/PPPs. Good Agricultural Practice (GAP) and animal husbandry compliance is part of FBOs' Food Safety Management Systems to assure chlorate is not used as a PPP.

Sources of chlorate traces are:

- Animal feed and drink – from water as a component, contact surface disinfectants and sanitisers
- Water – an ingredient in components, disinfectant and sanitiser solvent
- Food contact surface disinfectants and sanitisers



Sandwich Assembly:

Chlorates are not used as phytopharmaceuticals/PPPs. Good Agricultural Practice (GAP) and animal husbandry compliance is part of FBOs' Food Safety Management Systems to assure chlorate is not used as a PPP.

Sources of chlorate traces in components and the final assembled product are:

- Animal feed – from water as a component, contact surface disinfectants and sanitisers
- Water for irrigation (and hydroponics), flumes, as an ingredient in components, as a disinfectant and sanitiser solvent
- Food contact surface disinfectants and sanitisers