



Making Water Savings Safely

Developing Safe and Sustainable Water Policies in the
Food and Beverage Industry

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Making Water Savings Safely: Developing Safe and Sustainable Water Policies in the Food and Beverage Industry

With pressures to cut water in food and beverage production, Peter Wareing discusses where savings can feasibly be made and whether new innovations might hold the key to water reduction. This white paper also highlights the need for food and beverage companies to assess how any changes in water usage may impact the safety of their final product.

Water is a vital component in food and beverage processing, and has many primary functions: as an ingredient, as a processing aid, to deliver a heating or cooling process to the product (directly or indirectly), or for cleaning walls, floors and equipment. Secondary functions can also include its use in customer washrooms and for exterior cleaning.

The growing strain on water resources means food and beverage companies are under increasing pressure to reduce the water used in food and drink production and supply. From a food safety perspective, it is critically important to ensure that any changes in water usage do not interfere with the provision of a safe and stable final product to the consumer. This paper considers opportunities for water reduction, while maintaining product safety.

In order to identify the biggest and most cost effective water reduction opportunities, Leatherhead recommend companies carry out an audit of water usage at each stage in their production cycle.

PRODUCT, PLANT and COMPLIANCE are key considerations when reviewing water usage policies. PRODUCT describes all the water used during the manufacture or preparation of food and beverage items. PLANT covers all the water used in the factories, facilities or service outlets owned by food and beverage companies. COMPLIANCE reminds companies of the importance of adhering to food safety and regulatory guidelines.

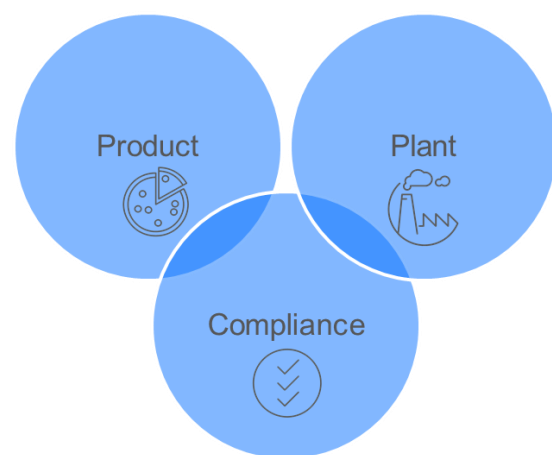


Fig 1. Key considerations when reviewing water usage



PRODUCT

Opportunities for using 'grey' or lower grade water

There are a number of different types of water, including:

- Mains (potable, drinking standard) water
- Water recycled from washing and other in-process activities
- Rainwater
- Water collected from dehumidifiers, steam exhausts and collection hoods

Water in contact with food, or work surfaces or equipment that come into contact with food, must be potable (drinkable). If water is recycled, then any microbial, chemical or physical contamination that may result from the use of this type of water must be removed before reuse. There are, however, opportunities for using lower grade water in other areas (as discussed later).

Removing water from products

From milk and custard to soups and pasta, dehydrated and powdered products have always been a staple of the kitchen store cupboard. Product development teams are now revisiting the concept of removing water from products in highly sophisticated ways. Technicians, for example, have experimented with removing water from chocolate; when the consumer eats the chocolate, the saliva in their mouth combines with the chocolate to form the ganache.

The rise of snacking and eating on-the-go means consumers are looking for smaller portion sizes, which by their nature will contain

less water. In response to this trend, for example, we have seen concentrated squash sachets hitting the shelves which require the consumer to add water to the final product.

Removing water will generally substantially change the format and/or texture/mouthfeel of a product. It requires an experienced food technician to consider the reformulation implications.

Water removal is likely to make products safer and more stable, as many pathogens grow less well in low water conditions. Yeast and mould, however, may become more of a concern.

Companies must ultimately consider whether the amount they save by removing water from their products is significant enough to warrant the effort; they may make larger savings by focussing their efforts in other areas.

Washing ingredients and products

Water is important for washing raw materials e.g. fruit and vegetables, fish, shellfish, some meats. Water for these purposes needs to be mains potable, or if recycled, filtered or treated to remove the microbial load that will build up over time, in order to prevent risk of cross-contamination. An example of fungal deterioration of sweet potatoes occurred in the retail chain when recycled water was used to wash the potatoes at the processor, causing the potatoes to rot after display on the retail shelf.

There are some products, however, which it is actually better not to wash; to avoid the risk of cross-contamination of the kitchen with *Campylobacter*, for example, it is recommended not to wash chickens.

Heating and cooling products

Many products are boiled as part of their preparation, which can use a lot of water. Steaming will generally use less water, since the food does not have to be immersed in water, and foods can be stacked above the steam source. In addition, the end product is more nutritious because the process is less destructive to the food. Microwave heating can deliver a shorter cooking time, again with less water required, saving water, and producing a healthier result.



Facility and equipment cleaning

A certain amount of water is always needed to wash properly and companies generally have their own protocols around this. Items which require regular cleaning include floors, walls, and work surfaces in contact with food, equipment, cutlery and crockery.

A 'clean as you go' policy can mean that dirt and food soil is prevented from adhering to work surfaces, so that less water may be required for final cleaning.

There are some interesting new innovations which will mean less water may be required for cleaning in the future:

- Gel cleaners for walls and other vertical surfaces use less water than other types of cleaning agents
- The use of 'self-cleaning' surfaces e.g. hospitals are looking into coating door handles and light switches with silver –

this can slow down the growth of microbes and prevent them spreading

- Other forms of disinfectant e.g. ozone and UV light can be effective surface disinfection methods; chemical foggers could be used in the final disinfection steps for utensils, so that less water may be required for this phase of cleaning
- Dry steam sanitising has been used to clean surfaces and equipment. This uses a high temperature, low pressure, low moisture steam, reducing water use. It can quickly clean and dry surfaces, with a high degree of kill due to the heat involved, with reduced water use, and no need for chemical disinfectants, due to the high temperature of the steam (115-155°C). It can also make operational time savings. Dry steam is also an effective degreaser

Recycling water

There is the potential for the use of lower grade, recycled, rainwater, or water from dehumidifiers and air conditioning units, and steam hoods over cookers. This could be used for toilets, for example, though the additional pipework involved may not make this practicable for all but rainwater. The use of rain or recycled water would probably require filtration and deodorising, to ensure that the customer is not adversely affected.

Recycled or rainwater could be used with minimal further preparation, for washing yards, and watering plants and gardens, again subject to not creating odours or other unpleasant experiences for customers.

Water-saving devices

There are now many devices available which operate more efficiently and use less water, for example water efficient dishwashers. Low flow taps and showers, and sensor flushing cisterns in washrooms can also save significant amounts of water. When re-fitting facilities or re-placing equipment, companies should consider purchasing the water-efficient versions – the financial savings in the long term will likely offset the initial financial outlay.



COMPLIANCE

Any changes to water usage must go hand-in-hand with a review of food and beverage safety strategy. It is vital that companies do not open themselves up to risk, particularly in the area of food and beverage production. The new UK sentencing guidelines mean the law can now impose high fines and even imprisonment as a punishment for breaches in food and beverage safety. The recent Teesside Crown Court case, with respect to a disregard of safe practices for handling and notification of foods containing allergens, saw a six year prison sentence handed to a restaurant owner.

If companies are considering changing the water usage in the processing of food and beverages, a full risk assessment must be conducted to ensure that safety is not compromised in any way. This should be built into and documented in the site HACCP plan. The risk of cross-contamination by microbial or chemical contaminants should always be considered. It is also worth reviewing this as part of company threat and vulnerability

assessment procedures (TACCP and VACCP).

There may also be a requirement for challenge testing of the product and process, to determine the potential risks. Challenge testing involves deliberately contaminating food products with relevant microorganisms to understand issues that may arise during processing, distribution and storage.

When the changes are actually implemented, regular reviews are recommended to ensure problems are quickly identified. It is also recommended that any series of changes are implemented one change at a time, so if there is a problem, it is easier to identify the source of the problem.

Water plays such an integral part of food and beverage production that companies must consider the implications should the cost and supply of water become critical. Those companies who plan now for a future where water is scarcer and more expensive are likely to reap the benefits of their early action and will avoid finding themselves on the back foot.

How Leatherhead can help

Contact safety@leatherheadfood.com to discuss any of your food and beverage safety needs. We can help you with desk based and on site risk assessments on any safety related issues. We can conduct HACCP audits, advise you on existing audit results, and guide you in preparation for external audits. We can also help you to troubleshoot microbiological problems.

About the author

Dr Peter Wareing is a Food Safety and Manufacturing Consultant at Leatherhead. He obtained his B.Sc in Agricultural Science from the University of Leeds, and a Ph.D in Plant Pathology from the University of Hull. Before he joined Leatherhead Food Research in 2001, he worked for the Natural Resources Institute undertaking development work on food processing and food security projects in Central and South America, Africa and South East Asia. Peter has many years' experience working in microbiological research, development and training. His specialist areas are food safety systems including HACCP, microbiology and mycology, and he is particularly interested in confectionery and snack foods, sauces and dressings, soft drinks and dried foods. At Leatherhead, Peter undertakes troubleshooting audits and investigations for clients, is an expert witness and delivers food safety-related sessions on training courses.

About Leatherhead Food Research

Leatherhead Food Research provides expertise and support to the global food and drink sector with practical solutions that cover all stages of a product's life cycle from consumer insight, ingredient innovation and sensory testing to food safety consultancy and global regulatory advice. Leatherhead operates a membership programme which represents a who's who of the global food and drinks industry. Supporting all members and clients, large or small, Leatherhead provides consultancy and advice, as well as training, market news, published reports and bespoke projects. Alongside the Member support and project work, our world-renowned experts deliver cutting-edge research in areas that drive long term commercial benefit for the food and drink industry.

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