

DPI Primefact

Microbial food safety risks associated with producing and processing fresh produce in bushfire-affected regions

December 2023, Primefact PUB23/1247, first edition

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Are your fresh produce production fields or processing facilities in or near a bushfire-affected region? Or do you source fresh produce from that region?

Re-assess microbial food safety risks associated with displaced wildlife due to bushfires and their potential intrusion in the production fields, water sources and processing facilities.

Bushfires have a devastating impact on wildlife, causing profound ecological and environmental consequences. The intense heat and rapid spread of bushfires often destroy natural habitats, leaving animals without shelter, food, and breeding grounds (Figure 1). The immediate consequence includes wild animals (e.g. kangaroos, feral pigs, deer, rodents and marsupials) escaping the fire-affected areas and potentially entering the fresh produce production fields for shelter, water and food.



Figure 1. Bushfires can force wildlife onto fields used to grow fresh produce, causing contamination.

The wild animals not only damage crops, affecting the quality and quantity of produce, but also introduce the risk of faecal contamination, potentially compromising the microbial safety of fresh produce. The wild animals' faeces might contain foodborne bacterial pathogens such as *Salmonella* and *Escherichia coli* (Kilonzo et al. 2013; Potter et al. 2011). These pathogens can survive for a long time and remain capable of contaminating produce. Research has shown that *Salmonella* can survive in animal faeces for up to one year (Topalcengiz et al. 2020), allowing adequate opportunities for the pathogens to be transmitted to the fresh produce. A source attribution modelling study has established the direct transmission of *Salmonella* with wildlife and companion animals' access to macadamia plantations (Munck et al. 2020). Pathogen survival and persistence in production fields depend upon many factors such as soil type, temperature, moisture, sunshine, animal type and pathogen.

Transmission of foodborne pathogens from wildlife to fresh produce

The transmission of foodborne pathogens from animal faeces to fresh produce poses a significant risk to public health and food safety. When animal faeces come into direct contact with fresh produce or the surrounding soil (Figure 2), pathogens such as *Salmonella*, *E. coli* and other harmful microorganisms can be introduced. Other factors, such as sprinkler irrigation or rain splash and wind, can transfer pathogens from faeces on soil to produce (Weller et al. 2017). The pathogens can adhere to the surface of fresh produce, leading to contamination that can persist throughout the supply chain and reach consumers. The risk is exacerbated during the harvesting process, where contaminated produce can be inadvertently collected and distributed.



Figure 2. Animal faeces (circled in red) and tracks (circled in blue) are signs of wildlife intrusion in the production fields.

Heat-stressed wild animals escaping the bushfire zone would be attracted to surface water sources such as farm ponds and dams. Animals defecating in or near water sources can lead to microbial contamination of the water. Using the contaminated water for irrigation and applying chemical sprays can transfer the pathogens onto the fresh produce. Furthermore, wild animals are more likely to be shedding bacterial pathogens in heat-stressed conditions than in normal conditions.

If fresh produce that is contaminated with animal faeces is processed in a packing facility, it can contaminate the postharvest wash water and cause cross-contamination. The harvest bins, postharvest equipment and premises can also be contaminated with these pathogens, resulting in them becoming established in processing facilities. Once these pathogens are established due to biofilm formation on surfaces, routine cleaning and sanitisation processes might not be effective in eradicating them.

Risk management options

To mitigate microbial food safety risks associated with wildlife and bushfires, rigorous prevention measures, including regular field assessments, prompt identification of faecal contamination, and the implementation of proper hygiene and sanitation practices, are essential to safeguarding

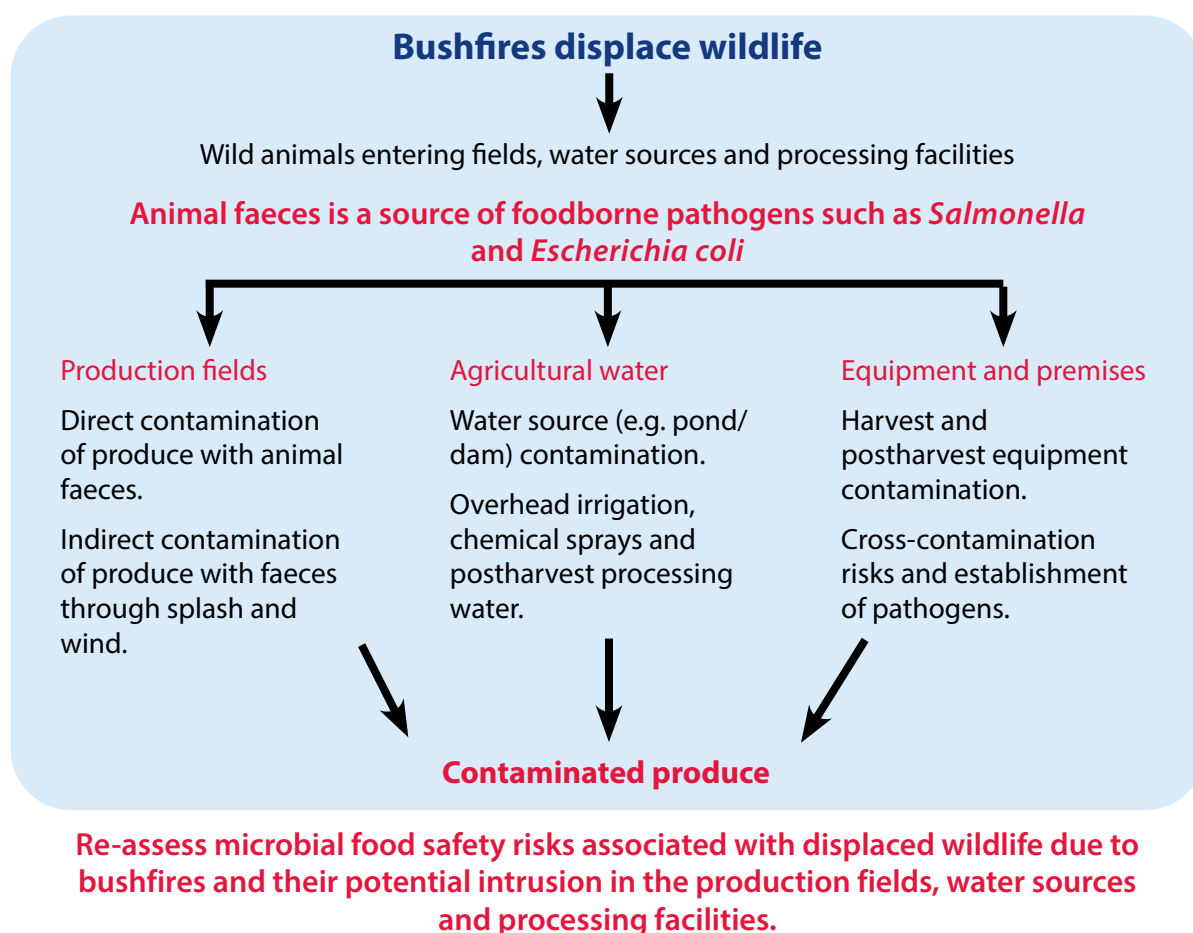
the integrity of fresh produce and ensuring the health and well-being of consumers. It is recommended that growers implement strategies to minimise the effect of wildlife on fresh produce microbial safety. The following measures are suggested:

- **Field monitoring:** growers should undertake inspections to look for signs of wildlife intrusion in standing crops and fallow land. Appropriate measures should be taken to minimise the microbial contamination risks.
- **Fencing and barriers:** physical barriers, such as fences and nets, can be installed to prevent wildlife from accessing cropped areas and water sources. This reduces the risk of faecal contamination of standing crops and water sources.
- **Preharvest inspection:** before each harvest, it is essential to conduct a thorough field assessment to verify the signs of animal intrusion or faecal contamination.
 - When faeces are discovered in the field or have directly contacted the produce, harvesting in that area (including buffer zones) should be avoided. Identify and mark the contaminated areas or produce and create a buffer zone. Buffer zones should have a radius of between 1 and 10 m, depending on the crop, production system, and animal type. The California Leafy Green Marketing Agreement recommends a minimum of 5 feet (~1.52 m) radius of buffer zone for leafy greens.
 - If faeces and contaminated produce can be easily removed and the contamination is relatively isolated, ensure thorough cleaning and sanitisation of all equipment involved in the removal process. Additionally, adhere to proper personal hygiene practices, such as handwashing, to minimise the risk of cross-contamination.
 - In cases of extensive faecal contamination or significant animal intrusion, refrain from harvesting the field. If there are any signs of a farm water source (e.g. pond or dam) being contaminated, a water sample should be submitted for microbiological testing. The water should only be used if it is not contaminated.
- **Educate harvest workers:** those involved in harvesting produce should be trained to look for signs of animal faeces in the fields, report it to the supervisor, and not harvest produce that could be directly or indirectly contaminated.
- **Inspect harvest bins:** ensure they are free from animal excreta, thoroughly clean the bins to remove any debris and foreign matter, and sanitise them.
- **Postharvest processing:** if harvested produce shows signs of animal faeces during processing, the operation should be stopped, and the harvested batch should be rejected. The processing equipment should be deep cleaned and sanitised. Concentrations of sanitisers in wash water and frequency of wash water change should be calibrated to compensate for the elevated risk of microbial contamination.
- **Packing or processing facilities:** thorough inspection, cleaning and sanitisation of processing facilities is recommended to minimise the risk of contamination and cross-contamination with microbial pathogens potentially linked to the wildlife in the field or processing premises. Rodent and vermin control measures should be revisited.

Summary

Growers should consider wildlife management in accordance with local regulations and without conflicting with environmental stewardship and conservation goals. A co-management approach that involves conserving soil, water, air, wildlife, and other natural resources while simultaneously minimising microbial hazards associated with fresh produce production is strongly recommended.

Bushfires can cause wildlife to affect fresh produce safety



Risk management

- Monitor wildlife in fresh produce production and processing environments.
- Fencing and barriers to prevent wildlife incursion.
- Preharvest inspection to determine the incursion and its scale.
 - Establish buffer zones around contaminated spots (isolated low level).
 - Remove the wildlife-affected crop and soil (isolated low level).
 - Refrain from harvesting (extensive damage).
- Educate workers to spot and report the intrusion signs (animal faeces and tracks) and to not harvest contaminated produce.
- Inspect harvest and postharvest processing equipment and premises.

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Acknowledgements

This Primefact is a contribution from 'Safe Melons' and 'Safe Leafy Veg' programs led by the NSW Department of Primary Industries. These programs acknowledge co-funding through Hort Innovation projects under the melon (VM20005) and vegetable funds (VG22002), which are funded by melon and vegetable growers' R&D levy funds and matching the contribution from the Australian Government.

**Hort
Innovation** MELON
FUND

This project has been funded by Hort Innovation using the melon research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

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FUND

This project has been funded by Hort Innovation using the vegetable research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

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