QUICK SERVICE RESTAURANT SECTOR ACTION PLAN INTERVIEW & OBSERVATIONS REPORT 2026

END FOOD WASTE AUSTRALIA

Australian Government
Department of Climate Change, Energy, the Environment and Water

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Executive Summary

Food waste is a major global and national challenge associated with economic losses, environmental impacts and food insecurity. In Australia 7.6 million tonnes of food is wasted per year, of which 70% is edible (FIAL 2021a). Food waste costs the Australian economy $36.6 billion annually. It also generates 3.5% of the nation's total greenhouse gas emissions, using 2,600 gigalitres of water and a landmass greater than Victoria (27.3 million hectares). Meanwhile, food insecurity is an ongoing issue in Australia, with 33% of households affected in 2025 (Foodbank 2025). Greater action is needed to reduce food waste across Australia. End Food Waste Australia (EFWA) is leading the way through Sector Action Plans developed to reduce food waste across different food industry sectors. Sector Action Plans work with key stakeholders across a food industry sector or along a food commodity supply chain to understand where food waste is generated, why it occurs and what can be done to reduce it.

The Quick Service Restaurant (QSR) Sector Action Plan (SAP) was developed to help address food waste in the QSR sub-sector and is part of a suite of foodservice or hospitality SAPs by End Food Waste Australia/Cooperative Research Centre. For this project, QSR refers to foodservice businesses that serve quickly prepared food with minimal table service, including fast food and takeaway outlets but not cafes. Included businesses may operate under a corporate franchise model and may provide food delivery through online platforms.

The QSR sector is a major player in the Australian hospitality industry. The sector generated $25.3bn in revenue in 2024, accounting for nearly a quarter of the total revenue in the wider hospitality industry (EMR 2025; IBIS World 2025). The sector is large and fragmented, with extremes in the concentration of market share, business types, and business locations. Business types include multinational-chain, Australian-chain and family-owned. The eastern seaboard contains the highest concentration of QSR business. There were 26,630 QSR businesses in Australia as of January 2025, employing 226,000 people. Major fast-food chains comprised the five largest QSR businesses, commanding 43.2% of the sector's market share in 2024 (IBIS World 2025).

The Australian foodservice and hospitality industry generates 1.2 million tonnes of food waste annually, with the majority disposed to landfill (FIAL 2021a) – over 324,000 tonnes are generated in hospitality. Of the total Australian hospitality sector, takeaway food outlets (incl. quick service restaurants) contributes 40% (130,600 tonnes) of food waste per year with 95% disposed to landfill (ARCADIS 2019, p. 76). Yet limited research has been conducted on food waste within QSRs (ARCADIS 2019; FIAL 2021b). This research project identified food waste hotspots within the QSR sector, focussing on insights from food/beverage retailers and corporate office/franchise outlets, to create a sector-wide action plan to address food waste. Reducing food waste within the QSR sub-sector will benefit businesses, decrease environmental impacts and help Australia to meet its objective of halving food waste by 2030 in line with Sustainable Development Goal (SDG) 12.3.

This report focusses on the interview and observation stage of this research project, a part of the overall methodology which included:

- Literature review of existing research on food waste generated in QSRs, published in Australia and internationally.
- In-person interviews and onsite observations of food practices and waste for a QSR chain in Melbourne.
- Survey of individuals who work at QSRs across Australia.
- Survey of managers and owners of QSRs across Australia.

Key insights from the interview and observation stage of this research include:

- Pre-preparation and service-ready stages as the key hotspots: Identified as critical stages where food waste occurs due to fluctuating customer demand, rigid protocols, and limitations in forecasting tools.
- End-of-Shift Practices as the secondary hotspot: Surplus pre-prepared food often ends up wasted, with inconsistencies in uptake of the food donation programs and donated food logged in the management system as waste.

- Limited staff agency as a root cause: Staff have minimal flexibility in decision-making due to strict corporate protocols, reducing their ability to proactively prevent food waste.
- Operational efficiency vs sustainability as a root cause: A predominant focus on operational efficiency at the corporate level overshadows sustainability goals, contributing to systemic waste across the QSR chain.

Recommendations to reduce food waste primarily focus on a shift in organisational priorities within QSRs to position sustainability as a core operational focus. Practical steps include balancing standardised processes and protocols with increased staff agency for decision-making, introducing staff training dedicated to food waste, refining digital back-of-house management tools, and expanding food donation programs to divert surplus food. By taking meaningful steps to reduce food waste, QSR business can align operational strategies with sustainability goals and contribute to Australia's efforts to halve food waste by 2030.

Please see the Quick Service Restaurant Sector Action Plan Final Report (Francis et al. 2026a) for the full project results and the complete QSR Sector Action Plan (Francis et al. 2026b).

End Food Waste Australia acknowledges the foundational funding provided by the Australian Government's Department of Climate Change, Energy, the Environment and Water. This Sector Action Plan was supported by research conducted through the End Food Waste Cooperative Research Centre with funding support from the Australian Government's Department of Industry, Science and Resources.

The Quick Service Restaurant's Sector Action Plan was co-funded by the New South Wales Environmental Protection Authority and Queensland Government's Department of Environment, Tourism, Science and Innovation. The research was conducted by RMIT University. Project partners included the Australian Retailers Association and National Retail Association.

1. Introduction

1.1 The Australian Quick Service Restaurant (QSR) industry

The Quick Service Restaurant (QSR) sector is a major player in the Australian hospitality and food service industry. In 2024, The Australian QSR sector generated $25.3bn in revenue, accounting for nearly a quarter of the total revenue in the wider hospitality industry (EMR 2025; IBIS World 2025). QSR is a term with a muddied definition, leading to varied perceptions of the types of businesses that fall into the category. For this project, QSR refers to foodservice businesses that serve quickly prepared food with minimal table service, including fast food and takeaway outlets but not cafes. Included businesses may operate under a corporate franchise model and may provide food delivery through online platforms.

QSR businesses in Australia serve a wide range of foods. Aside from burgers and chips, offerings include pizza, burritos, sushi rolls, rice paper rolls, salads, and grilled proteins. The sector also includes juice bars, smoothie bars, bubble tea shops, and ice-cream and frozen yogurt shops. This diversity reflects the sector's responsiveness to consumer demand for speed, convenience, and variety across dietary preferences and cuisines.

The Australian QSR sector is large but fragmented, with extremes in the concentration of market share, business types, and business locations. As of January 2025, there were 26,630 QSR businesses in Australia, employing 226,000 people (IBIS World 2025). Yet the five largest QSR businesses commanded 43.2% of the sector's market share in 2024 (IBIS World 2025). The largest QSR businesses in Australia are the parent companies of major fast-food chains. While QSR businesses are located across Australia, over three quarters of these businesses (specifically fast-food outlets) are concentrated in three states — Victoria, New South Wales and Queensland. New QSR businesses are also more likely to open in these three states. This distribution corresponds to the most highly populated states in Australia, where a larger population allows these businesses to access a larger consumer pool and gauge market acceptance more easily. The fragmented nature of the QSR sector makes it distinct from other hospitality and food service industry sectors in Australia.

1.1.1 Challenges affecting the QSR industry

The sector has remained strong despite significant challenges in recent years, including the COVID-19 pandemic, inflated food costs, the growth of online delivery, and competition from the wider hospitality and food retail sectors (IBIS World 2023). Continuing competition and inflation will drive businesses to seek ways to maintain profitability and minimise costs, while higher consumer consciousness about health and environmental concerns will continue to drive the industry uptake in sustainability initiatives (IBIS World 2023, 2025).

1.1.2 Effects of COVID-19

The Australian hospitality industry was significantly affected by the COVID-19 pandemic, bringing change to both the industry and consumer practices. The impact to QSRs has been mixed. Lockdowns meant that restaurants needed to pivot their offerings to include takeaway and home delivery options. The QSR sector was comparatively less affected as most providers had always operated under a takeaway business model. However, the competition to retain customers intensified as restaurants began to capture a large share of takeaway sales away from QSRs. There were additional challenges when lockdowns lifted. Continued remote work and online learning meant that foot-traffic to physical stores, a major source of revenue, was slow to recover but has risen since 2023 (IBIS World 2023).

Since the pandemic, consumer use of online food ordering and delivery platforms has continued to support the QSR industry with a sustained source of revenue. QSRs recognise that online food delivery platforms form a crucial part of their business, with many

larger businesses developing websites and mobile apps to improve the online ordering experience for consumers. However, a reliance on external platforms has also constrained QSR revenue due to high commission charges. Up to 35% of the order value is paid to the platform, an especially significant amount for smaller QSR businesses.

Food costs increased during the pandemic and have continued to do so due to inflation. QSR businesses have responded by examining cost saving measures such as waste reduction. Even so, increasing inflation has necessitated QSR businesses to raise their prices to consumers to cover food ingredient and labour costs. QSR businesses raising prices has had a mixed effect. While it has helped to increase revenue in the QSR sector, consumers are also choosing to moderate their spending amidst rising cost-of-living pressures.

Overall, the QSR industry has fared well despite the various challenges faced since the start of the pandemic, with revenue rising over the past 5 years at an average rate of 1.2% annually (IBIS World 2025).

1.1.3 Competition from restaurants, cafes, supermarkets and convenience stores

Restaurants, cafes, supermarkets and convenience stores are the key competitors to QSR businesses. Restaurants captured a large share of takeaway sales away from QSRs during the pandemic, but this is now easing due to cost-of-living pressures faced by consumers. Cost-of-living pressures have driven consumers to moderate or reduce their spending, trading down to favour more economical options. This trading down would ideally benefit QSR businesses. However, it has resulted in rising competition from supermarkets and convenience stores, with consumers opting for their ready-meal and takeaways options (IBIS World 2025). Cafes are another key competitor to QSR businesses, competing in the space of healthier food options. Demand in this space has increased due to heightened awareness by consumers over the nutritional content of food when eating out and a conscious effort to choose healthier options (IBIS World 2025). The QSR sector is responding by increasing the number of salad bars, juice bars, and sushi stores. Individual QSR businesses are responding by improving the nutritional content of their offerings and expanding their range of healthier options. By increasing the number of plant-based options offered to consumers, QSR businesses are also meeting a broader consumer demand for more environmentally friendly food options (Statista 2024). The QSR sector therefore continues to adapt to shifting consumer preferences and increased competition from the wider hospitality and food retail sectors.

1.2 Food waste in the QSR sector

1.2.1 Overview of food waste by quantity and type

There is currently a limited body of research that reports what and how much food is wasted in QSRs in Australia and internationally. At the time of writing this report, a search of publications from the past decade yielded only 7 studies with information specific to food waste in QSRs (ARCADIS 2019; Austin Resource Recovery 2012; Drewitt 2013; Filimonau and Ermolaev 2021; Gunders 2012; Jayasekara et al. 2024; McAdams et al. 2019). Of these publications, two relate to Australia (ARCADIS 2019; Jayasekara et al. 2024). Additional publications beyond this set included information on food waste in the wider hospitality sector or in the restaurant and café subsectors (i.e., FIAL 2021a; NSW EPA 2017; SRA 2010; Sustainability Victoria 2021).

The Australian foodservice and hospitality industry generates 1.2 million tonnes of food waste annually, with the majority disposed to landfill (FIAL 2021a) – over 324,000 tonnes are generated in hospitality. Of the total Australian hospitality sector, takeaway food outlets (incl. quick service restaurants) contributes 40% (130,600 tonnes) of food waste per year with 95% disposed to landfill (ARCADIS 2019, p. 76). This 40% estimate likely does not fully represent the full extent of what is wasted, as it does not mention dine-in options from QSR outlets[1]. The Baseline was updated in 2021 with information for the hospitality sector (see FIAL 2021a), but it does not provide separate figures for the QSR industry due to limited data. The most recent Australian study published in 2024, covering 2 QSR outlets, reported a 25kg daily average of pre-consumer food waste (Jayasekara et al. 2024). Given the lack of published research on food waste in QSRs operating in Australia, there is a pertinent need for more research to understand the food waste hotspots in QSRs. Hence the importance of this project.

Food waste in the QSR sector can be divided into two main categories: front-of-house or consumer food waste, generated after the food is sold to consumers; and back-of-house or pre-consumer food waste, generated before food is sold to consumers (see Figure 1). The focus of the QSR Sector Action Plan and actions that QSR businesses can implement to reduce back-of-house food waste.

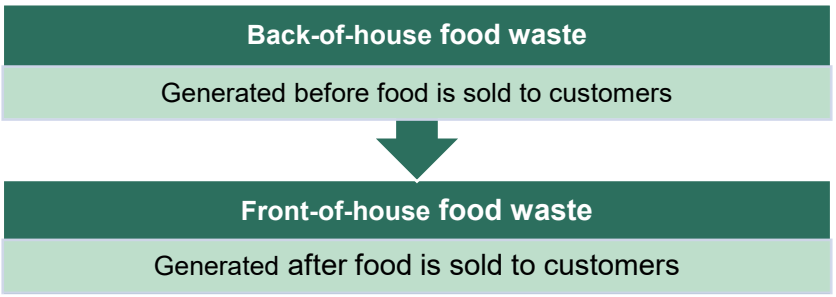

Figure 1: Division between front-of-house and back-of-house food waste

[1] The hospitality and food services sector in the 2019 National Food Waste Baseline is defined as including restaurants and cafes, hotels, catering, food courts and take-away food from quick service outlets.

1.2.2 Known drivers of food waste

There are multiple stages of food handling that can lead to food being wasted back-of-house in QSRs. In the literature, the most mentioned stage associated with food waste was the pre-preparation stage, followed by service-ready stage, and finally the stock storage stage (see Figure 2).

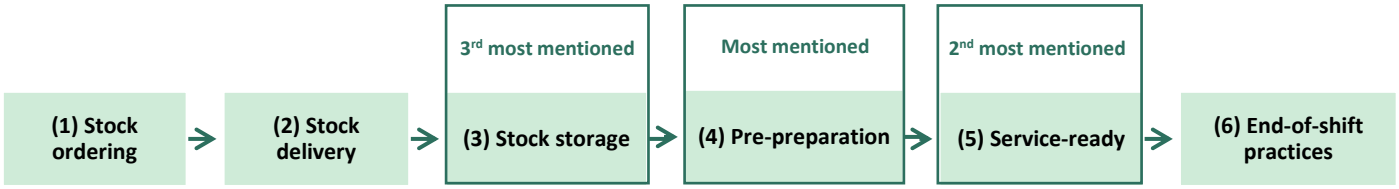

Figure 2: The food handling stages most mentioned in the literature in association with back-of-house food waste.

Reasons for food waste at the service-ready stage included food safety and hygiene concerns (Hirth et al. 2021) that are embedded in company policy, for example a major fast food chain ordering staff to dispose of fries within 7 mins of preparation (Gunders 2012). Human error in the service-ready stage, particularly for hot food, was also mentioned reasons for waste (Whitehead 2020). Human error was another mentioned driver of food waste at the delivery and storage stage (Dzumbunu 2018), when team members inaccurately predict the shelf-life of products (Kisok Marketplace 2021). Mechanical breakdowns of freezers were also mentioned as a challenge that can occur at the storage stage (Dzumbunu 2018). For the preparation stage, reasons for waste included off-cuts or trimmings and imperfect cooking (Filimonau and Ermolaev 2021; Jayasekara et al. 2024).

The five main categories (from most to least mentioned in the literature) as the reasons for food wasted in the back-of-house stages in QSR businesses are forecasting, hygiene, process, staff, and packaging (see Figure 3 overleaf). Under the forecasting category, the most mentioned reasoning for food waste generation was ‘preparation of too much food’ (i.e., Dhir et al. 2020; Jayasekara et al. 2024).while ‘ordering too much stock’ was another key reason (i.e., Filimonau et al. 2019; QSR Media AU 2022b). In the ‘hygiene’ category, the reasons of food waste related to storage period (i.e., Hirth et al. 2021), storage temperature (i.e., Emerson 2020), spoilage (i.e., Dzumbunu 2018), food recalls or faulty stock and dropped or spilled food (i.e., Dzumbunu 2018).

In the ‘process’ category, preparation offcuts (i.e., Jayasekara et al. 2024) and imperfect cooking (Filimonau and Ermolaev 2021) were the two most mentioned reasons for waste. The amount of preparation waste generated at a particular restaurant is dependent on what is considered edible and inedible, which has a number of cultural connotations (i.e., Jayasekara et al. 2024). Other process related reasons included poor storage (i.e., Marx-Pienaar et al. 2020), mistakes in preparing food orders (i.e., Cherryh 2019), inability to donate food (i.e., Jayasekara et al. 2024), and machine maintenance issues (i.e., Dzumbunu 2018).

The action or inaction of staff also play a role in back-of-house food waste in QSRs, with staff training or lack thereof a key driver (Dzumbunu 2018; Kisok Marketplace 2021; McAdams et al. 2019). Investment in further staff training (McAdams et al. 2019) or training staff on equipment that saves them time (Kisok Marketplace 2021), can result in less food waste (Dzumbunu 2018). However, there are challenges in providing further training to staff in the hospitality sector due to high turnover rates and increasing costs of training (McAdams et al. 2019). Lesser-mentioned staff-related reasons for food waste was management or staff direction issues (Filimonau and Uddin 2021; Noone and Coulter 2012).

Packaging was least mentioned of the identified categories for back-of-house food waste in QSRs. The most mentioned packaging reason was date labelling. This includes outdated date labelling practices, such as relying on staff to memorise the exact shelf life of products (Kisok Marketplace 2021). Although this literature review has not identified packaging as a frequently mentioned reason

for back-of-house food waste in QSRs, the impact of packaging on reducing food waste is known (Wohner et al. 2019). Packaging's role in reducing household food waste has also been explored in recent years (Chan 2022a, 2022b). Packaging's role in generating/reducing food waste in the QSR and wider food service sector is an under researched area.

Figure 3: Key reasons for food wasted back-of-house is QSRs, presented as five main categories from the most- to least-mentioned in the literature

1.2.3 Suggested solutions to reduce food waste

The solutions suggested in the literature to reduce food waste in QSRs relate to tweaking existing practices across all the different back-of-house processes. As guided by the food recovery hierarchy (see Figure 4), solutions to prevent food waste or surpluses should be prioritised where possible (FIAL 2021b, p.3; Fight Food Waste CRC 2019). Most of the currently suggested solutions fall into this category, possibly owing to promoting good business sense where reducing food waste reduces money wasted (Hanson and Mitchell 2017).

The most suggested solutions or strategies to reduce food waste include forecasting for pre-preparation (Oches 2018; WRAP and Guardians of Grub 2020), regulation of stock ordering (Dzumbunu 2018; Filimonau and Ermolaev 2021) and waste audits (Aytaç and Korçak 2021; Hollis 2019). These strategies assist in reducing food waste with the added benefit of reducing costs. Other waste reduction strategies pertain to proper management and efficient use of existing stock, including processes to improve storage practices (Dzumbunu 2018; WRAP and Guardians of Grub 2020), hygiene practices (Lal et al. 2021; Whitehead 2016), packaging (Martin-Rios et al. 2018; Marx-Pienaar et al. 2020), smart menu design (Dhir et al. 2020), stock rotation/labelling (Oches 2018; WRAP and Guardians of Grub 2020), protein cut to specification (WRAP and Guardians of Grub 2020), nose-to-tail cooking (NSW EPA 2017; Principato et al. 2021), machine guards to prevent spillage (Dzumbunu 2018), and dark kitchens to streamline production processes (WRAP and Guardians of Grub 2020). Staff play a crucial role as human behaviour is a factor behind the many ways food is wasted, so staff training (Hollis 2019; Marx-Pienaar et al. 2020) and employing a food waste manager (Principato et al. 2021) have been suggested to address this.

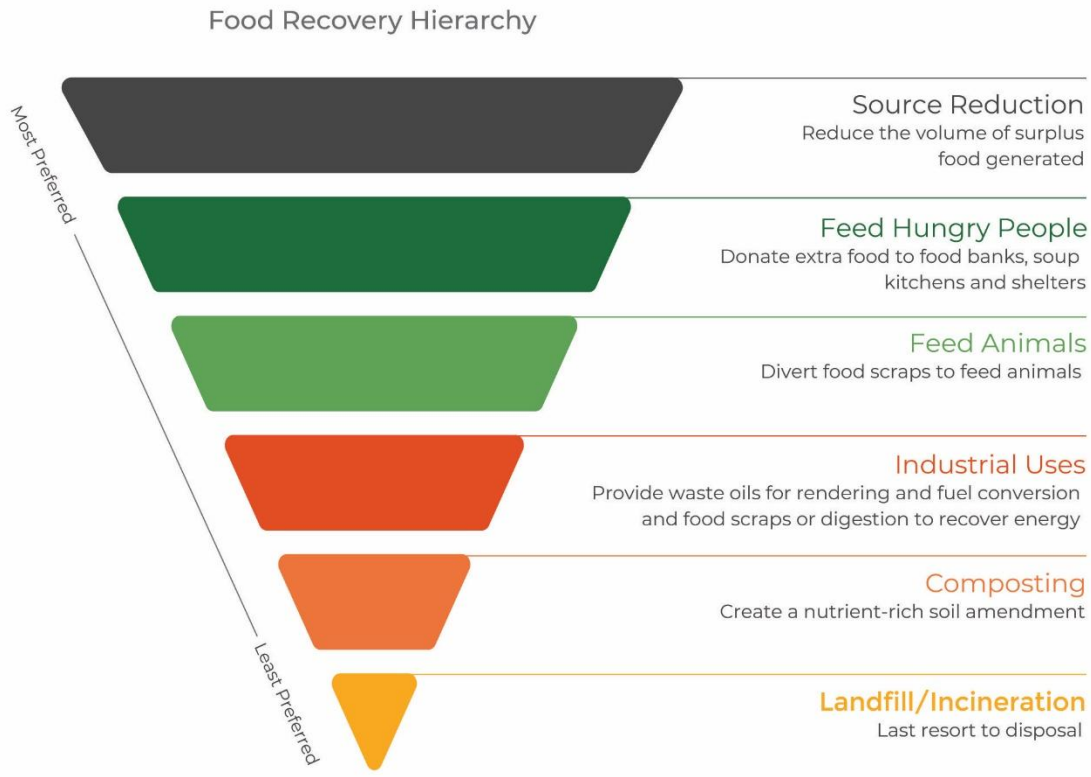

Figure 4: The Food Recovery Hierarchy, from Fight Food Waste CRC (2019) p.26

Where food waste cannot be avoided, the suggested solutions focused on increasing food waste diversion away from landfill or lower waste hierarchy solutions in favour of food donation (Martin-Rios et al. 2018; Sustainability Victoria 2021). Solutions include discounting surplus food (Jayasekara et al. 2024; Thong and Anich 2022) and tax benefits for doing so (Michalec et al. 2018; Thong and Anich 2022).

There are technological options available to help QSRs to implement several of the abovementioned solutions to reduce food waste. In fact, adoption of technology was the most mentioned solution category (68% of relevant publications), with many of these technological options promoted in QSR industry publications. These technological solutions are wide ranging, from artificial intelligence (AI) and cloud-based solutions to smart technology. Following the adage of 'what gets measured gets managed' for food waste reduction (Champions 12.3 2020), cloud-based platform solutions can provide auditing capabilities for QSRs to track waste (QSR Media AU 2023a). Smart scales can give real-time feedback on what items are being wasted and in what quantities so businesses can adjust accordingly (Clowes et al. 2019; Daninhirsch 2022). Menu and recipe engineering capabilities offered by cloud-based AI platforms can help QSRs reduce waste through efficient use of food ingredients (QSR Media AU 2023b). Internet-of-Things (IoT) based AI systems can be trained to prevent food preparation and spoilage waste by up to 10% (Aytaç and Korçak 2021). Predictive AI can combine previous sales data and real-time weather forecasts to predict food preparation amounts and timings, reducing surplus (Groene and Zakharov 2024). Furthermore, modern robotics technology can assist production management and reduce order errors in QSRs (Noone and Coulter 2012). When there are surplus, mobile apps such as Y-Waste in Australia (Thong and Anich 2022) and Too Good to Go globally (QSR Magazine 2023; Vo-Thanh et al. 2021) have offered a platform for QSRs to redistribute this surplus through discounted sales and donation. While Y-Waste is no longer operational, it acted as a proof of concept for food waste apps in Australia. Too Good to Go entered the Australian market in 2024 and partnered with over 1300 businesses in the first 12 months (Retail World 2025; Too Good To Go 2024), suggesting strong scalability and mainstream acceptance of surplus food apps in the Australian QSR sector. Existing technological solutions therefore offer QSRs options to tweak their practices across the different back-of-house processes. As these technological solutions have been promoted in QSR industry publications as a 'quick fix', there is an opportunity for research to explore their effectiveness in practice.

1.3 Knowledge gaps identified from the literature review

A review of the current literature on food waste in QSRs published in Australia and overseas revealed gaps in current knowledge (Chan et al. 2026). These gaps represented research opportunities that guided the data collection of this research project. This research project responded to opportunities to conduct research specific to the Australian QSR sector, to better understand what foods are wasted, where waste hotspots occur, the reasons for waste, and the effectiveness of current solutions. By addressing these gaps, this research project contributes to building a more comprehensive overview of food waste in the Australian QSR sector, to inform targeted approaches to waste reduction. In particular, this research project focused on identifying food waste hotspots and root causes, supporting the development of a sector-wide action plan to reduce food waste across the Australian QSR sector. Please see the Quick Service Restaurant Sector Action Plan Final Report (Francis et al. 2026a) for the full project results and the complete QSR Sector Action Plan (Francis et al. 2026b).

1.3.1 Research specific to the QSR sector in Australia

This research project responded to an opportunity to conduct a greater number of food waste research studies that focus specifically on the QSR sector. To date, limited research has been conducted on food waste generated in the QSR sector, especially within the Australian context (ARCADIS 2019; FIAL 2021b). Existing research studies have mostly focused on the wider hospitality industry. This lack of distinction is an issue as the QSR sector has specific practices that set it apart from the other sectors in the hospitality industry (IBIS World 2023). Sector-specific studies are valuable in that the generated insights are deeper and more nuanced, useful to tailor solutions to reduce food waste across the sector — essential to developing a sector action plan.

1.3.2 Data on what foods are wasted and how much

This research project responded to an opportunity to identify the specific types of food wasted in the Australian QSR sector and quantify this waste. Current national data on food waste in QSRs is limited, lacking detail on food types and quantities wasted (ARCADIS 2019). Gathering such data aligns with a recommendation by FIAL (2021b, p. 28) to track waste volume and costs in the hospitality sector. Understanding the scale of a problem is an important step in managing it (Champions 12.3 2020). The additional nuance of understanding what foods are wasted forms a stronger foundation to identify hotspots and recommend solutions.

1.3.3 Information on what factors drive food waste

This research project responded to an opportunity to identify the reasons why food is wasted in the Australian QSR sector. Current information on food waste drivers is from studies conducted internationally, so this project responded to an opportunity to examine whether these drivers apply to the Australian context. This included exploring the role of kitchen staff in the processes across different food handling stages. The project also responded to an opportunity to explore whether the factors that drive food waste differ across multiple types of QSR businesses. Gathering this information helped to identify root causes to tailor targeted solutions.

1.3.4 Information on the effectiveness of current solutions

This research project responded to an opportunity for research that engages QSR businesses in dialogue about what strategies they have used to reduce food waste and perceptions of their effectiveness. While there are recommendations within academic and industry literature on ways to reduce food waste within hospitality settings (WRAP and Guardians of Grub 2020), there is currently limited information on the effectiveness of these solutions, especially within the QSR sector. Such research provides insights into the challenges QSR businesses experience when implementing solutions to reduce food waste, enabling a more nuanced and context-sensitive approach to recommending appropriate solutions.

2. Methodology

2.1 Overview of methodology

This project was a mixed methods study that identified hot spots and root causes of waste across the QSR sub-sector. Ethics approval was provided by the Human Research Ethics Committee at RMIT, approval number 2024-27340-24094 for the *Quick Service Restaurants (QSR) Sector Action Plan Chapter (Project 1.1.7).*

The overall methodology included:

- Literature review of existing research on food waste generated in QSRs, published in Australia and internationally .
- In-person interviews and onsite observations of food practices and waste for a QSR chain in Melbourne.
- Survey of individuals who work at QSRs across Australia.
- Survey of managers and owners of QSRs across Australia.

This report focusses on the interview and observation stage of this research project. Please see the Final Report (Francis et al. 2026a) for the full project methodology.

The research team conducted in-person fieldwork across four sites of a multinational QSR chain that operates nationally in Australia. Population densities significantly impact how QSR establishments are distributed across Australia, with Victoria, New South Wales, and Queensland housing more than three quarters of QSR establishments nationally. The sites were in metropolitan Melbourne (Victoria) and the research team visited during August 2024. The data collection and analysis for this field work was based upon the case study methodology (Yin 2018), to investigate back-of-house food waste phenomena in QSRs. The site visits encompassed semi-structured interviews (see section 2.1.1) followed by observations of the back-of-house areas (see section 2.1.2), for an in-depth insight of the operational practices and challenges faced at the ground level within a QSR environment. The sites (or cases) represented diverse operational contexts, enabling the research team to build a rich account of food waste practices and conduct cross-case comparisons. Participation was voluntary and informed consent was provided. Appendix A1 outlines the process of the site visits.

2.1.1 Semi-structured interviews

Each site visit began with a 1-hour semi-structured interview with the on-site assistant manager. Semi-structured interviews combine pre-determined questions with the opportunity for follow-up questions, enabling a deeper understanding of the participants' experiences, perceptions, and perspectives on a specific topic (Creswell and Creswell 2022). A total of 21 questions were asked during the interviews, outlined in Appendix A2.

The research team asked the participants questions that related to:

- Overall perceptions of food waste
- What food products are wasted back-of-house and quantity
- Food handling processes and stages associated with food waste
- Employee roles and responsibilities in relation to food waste
- Strategies currently used to reduce food waste

The interview audio was recorded with permission and transcribed. The analysis process is outlined in section 2.2.3.

Aside from serving to collect research data, the semi-structured interviews helped establish rapport between the researchers and participants. This created a natural segue to the second part of the site visits, which focussed on on-site observations.

2.1.2 On-site observations

The second part of the site visits involved observations of the back-of-house areas, including the kitchen, storerooms, and waste management areas. Each observation lasted 3 hours, to enable the research team to observe a variety of processes (e.g. start of shift preparations, waste management), the duration of processes (e.g. cooking of raw ingredients) and to witness any fluctuations (e.g. in order volumes). Appendix A3 presents the observations guide.

The research team focussed the observations to the categories of:

- What food products are wasted back-of-house
- What food handling processes and stages are associated with food waste
- Equipment and technology used to manage kitchen processes
- Employee roles and responsibilities in relation to food waste
- Strategies currently used to reduce food waste

Field notes were jotted in relation to the abovementioned categories. Photos were captured, with consent, of food waste, kitchen equipment, and storage areas, and waste management areas. The back-of-house area was mapped out, with areas associated with food waste noted, to assist the research team with noting the physical contexts in which food waste was generated. Participants also provided the researchers a copy of the corporate issued food handling guidelines and procedures displayed in the back-of-house areas.

Building rapport and trust with participants is an essential part of a site-observation. Rapport building began with the first part of the site visit, the semi-structured interview, where a representative of the research team engaged in conversation with the manager. During this conversation, the manager was given an opportunity to ask questions to better understand the purpose of the site visit, helping to build trust. As a result, other on-site employees appeared eager to show the back-of-house environment and processes during the observation period, and follow-up questions were welcomed. Overall, this enabled in-depth insight into the operational practices and challenges faced at the ground level within a QSR environment.

2.1.3 Data analysis

After the site visits, the collected data were collated and prepared for analysis. These data included interview transcripts, site observation field notes, photos, and documents (food handling guidelines and procedures). Using tables as a key analytical tool, the research team systematically compared the four cases to identify patterns, similarities, and differences (Yin 2015). The comparative tables that informed the analysis are presented in Appendix B. Analytic memos were written to document emerging patterns, key insights, and connections within and across the cases (Yin 2015). The iterative process of generating analytic memos helped consolidate findings and refine the insights presented in this report. In line with producing a sector action plan, the analysis was pragmatic and focused on identifying root causes of food waste and actionable strategies for reduction, based on the practical realities gleaned from the cases.

3. Results and Discussion (Insights)

3.1 Food Waste Account

The site contexts presented in 3.1.1 provide a backdrop to better understand the operational processes and food handling practices at the QSR chain. Sub-sections (3.1.2–3.1.7) provide an account of food wasted back-of-house observed during the different food handling stages. Figure 5 summarises these stages.

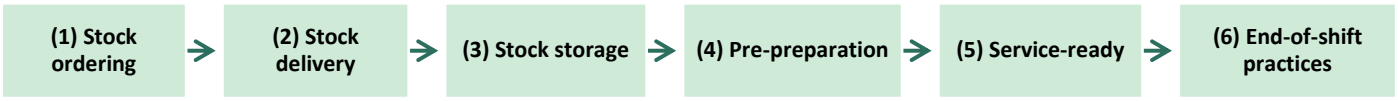

Figure 5: Back-of-house food handling stages in QSRs.

3.1.1 Site contexts

The site visits encompassed four metropolitan Melbourne locations of a multinational QSR chain that operates across Australia. The main food products served by the chain include grilled chicken, burgers and wraps. All four sites (Sites A, B, C and D) visited by the research team were corporate owned. The QSR chain also operates a portion of stores under a franchise model. The study sites covered the retail environments of shopping centres and standalone locations, each with unique characteristics. Two sites (Site A and Site B) were located within shopping centres. Each were operated as its own store with dedicated restaurant-like dining areas, offering customers quick service food in a manner distinct from the typical takeaway-only service of food courts. The other two sites (Site C and Site D) were standalone locations situated on busy urban thoroughfares with high pedestrian traffic. Site D is a flagship store, where new staff are trained and recipes are tested. All the four sites are near other food establishments, including QSRs. Sites A, B and C are within walking distance to a cinema. Site D is within walking distance to live music venues.

Typical operating hours for the stores were from 11:00 AM to 10:00 PM, with the lunch rush (11am-2pm) being the busiest peak time at all four sites. Sites A, C and D experienced a second smaller rush for dinner from 7pm. All but one of the surveyed sites employed approximately 20 staff, with 3-5 staff working at a time, depending on the store size and number of customers. The largest store (Site B) was also the busiest, with 50 staff on rotation of 10 staff working at a time. The semi-structured interviews at each site were conducted with the assistant manager. On average, each assistant manager had worked at the store for 1.5–2 years, with previous experience at other QSR establishments. There was an opportunity to meet and talk to other staff (the manager and kitchen staff) during the kitchen walk-through and site observation.

The back-of-house food preparation and storage facilities differed in layout across the stores but were functionality comparable, as staff at all the stores were directed to follow corporate issued guidelines for food preparation and storage. These guidelines included where and how certain food ingredients should be stored, as well as the layout of the food preparation workstations. Waste management procedures differed across the shopping centre and standalone stores. The stores located at shopping centres generally used centre-managed waste management facilities, while the standalone stores generally used privately operated or council-operated waste management services.

3.1.2 Stock ordering

Stock ordering at a QSR establishment ensures that essential goods needed for daily operations — such as ingredients and beverages — are available to prepare menu items for customers. Part of the ordering process involves maintaining adequate inventory levels to meet customer demand, while avoiding excessive surplus that may be wasted. Stock ordering at the visited sites was managed through a cloud based, digital back-of-house management tool. The digital management tool was used across all the stores of this QSR establishment and all aspects of back-of-house management, from stock ordering to waste reporting. The digital tool provided each store real-time monitoring of stock levels and sales data. The tool leverages historical store data for its AI-prediction capabilities, guiding store managers on the quantity of stock to order. Although the digital tool has multiple capabilities, it struggles to account for unpredictable external influences, leading to overstocking. Excess stock can result in food wastage if items expire or cannot be sold. Thus, while store managers have been encouraged to follow the AI prediction, they said that they often adjusted orders based on 'common sense' and experience.

3.1.3 Stock delivery

The overall stock ordering and delivery processes was similar across the majority of the sites, with management staff ordering and receiving stock during the shift. The general delivery process involved stock being unloaded and wheeled to the back-of-house area for storage. Invoices were then handed to the manager. Site D stood out in that a third-party supplier would deliver stock outside of business hours directly into the cool room. The overall type of delivery was consistent across sites, with variations on the frequency based on store size (including storage space) and demand. Most stores received daily deliveries of chicken, the main ingredient in multiple menu items. This was supplemented by regular deliveries of vegetables, drinks and bread items every 2-3 days. Food waste during delivery was reported by staff to be rare but occurred on occasion due to quality issues with delivered products. Lettuce and other fresh produce were previously of poor quality when delivered, but the issue was resolved by switching suppliers. Staff at Site D also reported challenges with the cool room door being left open after a delivery, so reminder signs were put up to avoid potential food waste from temperature issues.

3.1.4 Stock storage and rotation

The staff at all sites stored food ingredient deliveries immediately upon arrival to maintain freshness. Staff followed a corporate-issued guideline for food storage, detailing how and where items should be stored on shelves and in cool rooms. A key part of this process involved rotating inventory using the FIFO (first-in, first-out) principle. Staff labelled deliveries with arrival dates in addition to the manufacturer issued best-before / expiry dates. Staff then moved older stock up the front of storage and pushed the newer stock to the back. Under this principle, opened packages and older stock were prioritised to be used first when staff prepared food. This principle is consistently applied to rotate food inventory efficiently. However, drinks stored in the fridge behind the front counter typically cycled through quickly, making rotation less critical for these items.

Food waste at the storage stage was minimal, primarily due to effective FIFO or rotation practices. When food waste did occur, it was primarily due to out-of-date stock. Waste occasionally occurred for opened items with low demand, such as kale. Corporate-issued shelf-life guides determined how long all food can be kept after packaging was opened or once prepared. Staff reported that frozen foods, including produce used in cooked dishes, were rarely wasted due to their longer shelf life. To further minimise food waste, there are opportunities to assess and optimise ordering strategies for low-demand perishable items, such as purchasing smaller packs. Additionally, there is an opportunity to improve equipment maintenance; one site reported a malfunctioning cool room temperature gauge that nearly caused stock wastage. Greater support from higher management for equipment maintenance and timely replacements could further minimise food waste.

3.1.5 Pre-prepare menu items

Quick service is a defining feature of a QSR establishment. Pre-preparation of menu items is key to enable QSR establishments to provide this service efficiently and reliably. To maximise efficiency and reliability, food pre-preparation processes operate on multiple levels at the sites. At the sites visited, this process began with ingredients that were delivered pre-cut or pre-marinated, such as pre-cut and marinated chicken, pre-cut frozen vegetables, and pre-cut coleslaw. This reduced food handling time and streamlined preparation processes. The next level of pre-preparation involved pre-cooking menu items. Chicken was precooked using timed ovens. Tomatoes and cucumbers were chopped before store opening, for menu items such as salads, wraps and burgers. Staff followed standardised recipes provided by corporate management. Staff typically had a two-hour window to pre-prepare food each morning before the store opened to serve customers.

Waste at the pre-preparation stage consisted of vegetable trimmings and offcuts, which was reported by staff to be minimal. However, food that was pre-prepared at this stage had the potential to be wasted downstream at the service-ready stage if it remained unsold. Managers have been directed by corporate to follow the AI forecast of customer levels by the digital management tool. However managers said that the tool cannot be blindly relied upon as it often over or under predicted. The tool is limited in its ability to account for certain external factors, such as local entertainment events, that can significantly affect customer levels. Therefore, similar to the food ordering stage, managers relied on 'common sense' and experience to balance the quantity food staff were directed to pre-prepare. Additionally, occasional miscommunication among staff about stock levels of pre-prepared items contributed to over-preparation, further increasing food waste.

3.1.6 Preparing and serving customer orders

Customers can order their meal from the front counter, with additional orders from delivery apps sometimes coming through a separate system. This means that at certain sites, staff were managing two ordering or 'point-of-sale' (POS) systems. Staff at all sites prepared customer orders on-demand using pre-prepared ingredients, with the guidance of recipes and cooking timers to ensure consistency. Pre-prepared or pre-cooked foods were stored in temperature-controlled holding bays at the different kitchen stations where staff prepared customer orders. This included pre-cut frozen fries under the fryer, and pre-cooked chicken under the grill. Stations were designated for specific order types, including burgers, wraps, and salads.

Despite pre-preparation efficiencies, food waste occurred during peak hours when staff were rushed to keep up with orders. Items were dropped or burned and a small number of orders were incorrectly prepared. Additionally, staff said that they were directed to follow corporate issued shelf-life guidelines for pre-prepared and pre-cooked items. This led to food wasted due to time-temperature limits, particularly for hot items including chicken and fries. There is an opportunity to reduce food waste by pre-cooking a smaller amount in advance and cooking more foods to order. However, this approach would require balancing increased pressure on staff during peak service hours.

There were inconsistencies in how staff across the sites recalled time-temperature limits for the chicken and fries during the interviews, and these time-temperature limits potentially differed from corporate issued shelf-life guidelines. This highlights the challenge of staff managing the shelf-life of a variety of ingredients and pre-prepared menu items, especially for newer staff. Regular refresher training on the shelf-life guides could assist, in addition to corporate management developing summarised visual guidelines that staff can quickly refer to during shifts.

Staff reported an issue where food delivery platforms failed to notify the store when an order was cancelled, leading to uncollected orders being wasted. Improved communication between delivery platforms and QSRs could help address this issue.

3.1.7 End of shift practices

End-of-shift practices include stock-take and waste categorisation reporting through the digital back-of-house management tool. This is the same tool that provides AI-predictions for stock ordering and pre-preparation of menu items. Specific protocols for waste logging capture details about when and how items were discarded. These categories include raw or cooked waste; damage/ dropped stock; out of time/ temperature preparation waste; end-of-day waste; returned customer item. Staff typically logged wasted items by piece, depending on the system programming. Certain items were purportedly logged by weight; but staff often estimated rather than use scales. Managers generated weekly spreadsheets detailing stock and sales, sent to headquarters for review. While the stock-take and waste logging system are a way to track and manage food waste, staff reported issues with the system. That is, most ingredients were delivered in bags by weight, with an averaged piece count used for stock-take (number of items in inventory versus what is sold). This averaged count was sometimes inaccurate, meaning that the system logged waste for items that were sold.

End-of-shift waste stems from unsold food items that cannot be retained due to time-temperature regulations. Although donation programs alleviate a portion of this waste, limitations in storage and staff awareness have prevented comprehensive adoption. Stores that participated in food donation followed strict guidelines to ensure that donated food would be palatable and safe for consumption. This means that stores only donated certain items, such as whole and half chickens. Management staff said that they logged donated items into the system as waste. Plate waste, while visible, remained untracked and unreported.

End-of-shift practices also included waste management. Most stores had three waste bins — compost, recycling, and general waste. Staff said they are guided by corporate-issued instructions on proper disposal, such as placing all food scraps and food waste into the compost/ green waste bin. However, the staff at Site C reported a lack of access to composting facilities. Smaller bins from the kitchen stations were emptied at into larger bins at a separate waste station, either at the end of shifts or on an ad-hoc basis. Certain standalone stores reported issues with the larger general waste bin being filled up before they are collected. This was generally not an issue faced by stores utilising waste facilities managed by shopping centres.

3.2 Hotspots and Root Causes

The analysis of the site visit data revealed that back-of-house food waste was associated with all the different food preparation stages (see Figure 5). This is unsurprising given that all the stages are linked, where actions from one stage directly affect the next stages. However, certain stages were more associated with food waste and were identified as hotspots. The majority of food waste (or surplus food) was generated in pre-preparation stage and service-ready stages, representing the key hotspots. End-of-shift practices determined how the staff managed this food waste (or surplus food), representing another hotspot. This section reports on these food waste hotspots and discusses possible root causes.

3.2.1 Main hotspot: pre-preparation and service stages

The pre-preparation stage and service-ready stages were identified as the key hotspots, representing the stages where the majority of back-of-house food waste (or surplus food) was identified during the site visits. This aligns with findings from the literature review (see section 1.2 and Chan et al. (2026)), which reported twice as many instances of food waste during the preparation and service-ready stages than the delivery/storage stages. The root cause of this is likely due to the main focus of a QSR, which is to quickly serve the number of expected customers (Drewitt 2013). Pre-prepared food ensures that staff can efficiently serve customers, providing the quick service that customers expect at a QSR establishment. Time-temperature limits mean that the quantity of food that staff pre-prepare may only sufficiently cover part of the service-ready shift. To adapt to this, staff continue food pre-preparation process after the start of service-ready stage, intertwining the two stages (see Figure 6). Food waste therefore occurs when there is

a misalignment between the amount of food prepared, when the food was prepared, and the number of customers expected at a given time. This means that food waste that manifests at the service stage begins in the pre-preparation stage.

A major source of food waste in the service-ready stage is a surplus of pre-prepared food due to time x temperature protocols and fluctuating consumer demand. Time-temperature limits are based in food safety and communicated to staff through a corporate issued shelf-life guide. This protocol for how long food can be held for service after pre-preparation varies depending on the item, but hot/cooked foods have a shorter holding time than cold/ raw (salad) items. Management/staff are required to constantly keep track of holding times for multiple food items, aiming to only pre-prepare the amount that would be served within these periods. This also means that during peak hours, staff may pre-prepare multiple batches of the same food items to replenish what has been sold, leading to surplus that is unsold at the end of the shift (see section 3.2.2). Chicken was identified as the most wasted food across the visited sites due to its central role in menu offerings and the longer time required for cooking. This means a sufficient quantity of chicken must be pre-prepared in case there is a surge of customers, but quantities surplus to demand may often remain unsold at the limit of the holding period (2–4 hours). A similar challenge was reported for fries, which had a 5–10-minute holding time across the visited sites. While certain stores cook to order, this is not always possible during the rush of peak service. The literature acknowledges the challenge of hot food wasted in associated with time x temperature protocols, including a reported 7-minute holding time for fries at a multinational QSR establishment (Gunders 2012), suggesting that this is a continuing challenge for QSRs. Predicting customer demand for food or menu items across different holding periods is therefore a critical challenge for QSRs.

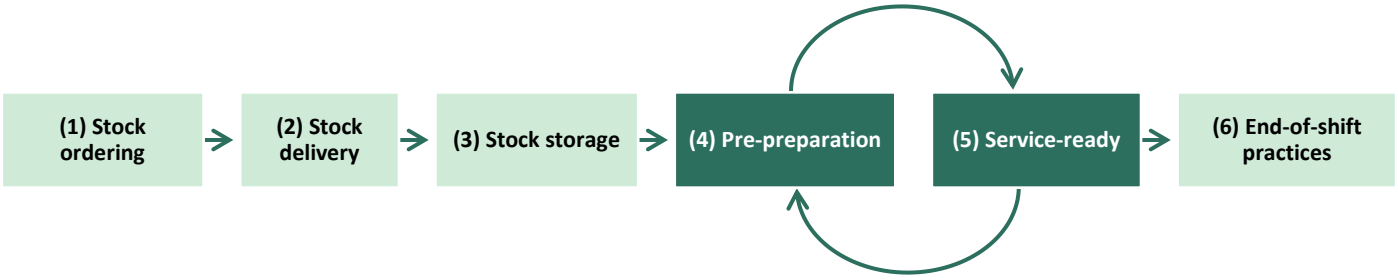

Figure 6: The pre-preparation and service-ready stages are intertwined food waste hotspots

The challenge of predicting customer demand is widely discussed in the literature pertaining to back-of-house food waste in QSRs (e.g. Drewitt 2013; Filimonau and Ermolaev 2021; Filimonau and Uddin 2021; Jayasekara et al. 2024). Misprediction of service accounts for an estimated 10% of food waste at fast food establishments, a subset of the QSR sector (Gunders 2012). Technological solutions, especially digital back-of-house management tools were the most mentioned ways to address this food waste (i.e., Cherryh 2015; Davityan 2023). These tools contain features that help staff manage multiple back-of-house processes, including AI-based forecasting of customer levels for stock ordering and food pre-preparation (i.e., Noone and Coulter 2012; QSR Media AU 2023b). A version of this digital tool has been adopted across all sites of the QSR establishment visited by the research team. Management and kitchen staff at the store level have been directed by corporate management to use this tool to manage all food preparation processes, including following the predictions by the AI-based forecasting. However, inaccuracies in forecasting were a driver of surplus pre-prepared food. Staff reported limitations with the AI-based predictive system, particularly in accounting for external variables. Managers needed to use their experience and judgment when following the AI forecasts (see section 3.2.3). This suggests that while digital tools and AI-based forecasting are a useful tool to help QSR establishments manage food waste, its predictions are limited and cannot fully replace human judgment.

3.2.2 Secondary hotspot: End-of-shift practices

End-of-shift practices represent a critical stage in managing surplus pre-prepared food, determining whether this surplus becomes waste. While this hotspot is secondary to the pre-preparation and service-ready stages, it is vital in aligning practices with the food recovery hierarchy where prevention is the most preferred option (Fight Food Waste CRC 2019). Donating surplus food (fit for human consumption) should take precedence over disposal (WRAP and Guardians of Grub 2020). On the surface level, the QSR chain (subject to the research site visits) is moving toward the right direction. There is a company endorsed food donation program. Corporate-provided waste management plans encouraged staff to sort inedible food waste into compost bins rather than landfill, as in line with the food recovery hierarchy. However, the site visits suggest that current practices at the store level lean toward disposal rather than donation. In regard to disposal, certain stores do not have access to composting facilities and even for stores that do, a certain amount of food waste is still disposed into the general waste bin. A root cause could be a lack of staff incentive to prioritise food donation over disposal. In the daily waste reports logged by managers, food is logged as wasted whether it is disposed of or donated, because it represents a financial loss for the store. Staff training specific to food waste (see section 3.2.4) may help to address this issue, to increase awareness of the true cost of waste (Verghese et al. 2018). This includes the financial costs of waste disposal, which could be reduced if more edible food is donated and not wasted.

Insights from the site visits suggested that at the store level, there is an inconsistent implementation of the corporate endorsed food donation program. The assistant manager at the flagship store supervised food donation for multiple stores, while the assistant manager at another store wanted to donate food but was unaware of how to participate. This inconsistency is concerning given that the food donation program is advertised on the QSR chain's public facing website as a company-wide program. Policies that discourage staff from taking food home and limitations on eligible donation items, such as only allowing certain cuts of chicken to be donated, further compound the issue. This inconsistency reflects a potential misalignment between the QSR chain's public-facing image, which promotes sustainability and food donation, and the practical realities of implementation at the store level. Barriers to prioritising donation are not unique to the visited QSR sites but reflect industry-wide concerns identified in literature. Reputational risks and liability concerns have been mentioned as common obstacles to food donation (Davityan 2014; Dhir et al. 2020; Filimonau et al. 2019; Hirth et al. 2021). Although Australia's 'Good Samaritan Act' protects businesses from civil liability when donating food in good faith, many food businesses remain risk-averse due to concerns about legal repercussions and negative reviews (Addison-Smith et al. 2024; Beckmann et al. 2022). Moreover, operational challenges, such as the sporadic generation of food waste throughout the day, misalign with donation models that require food collection at specific times. The time needed for staff to manage food donation programs can strain operations in fast-paced environments such as QSRs, where staff are already under pressure to meet service demands (Martin-Rios et al. 2018; Thong and Anich 2022). These barriers hinder the effectiveness of donation efforts and shift the focus to waste disposal instead of prevention. These barriers that individual stores face to participate in food donation programs are further compounded by limited staff agency in decision-making, as store-level employees often lack the autonomy to effectively implement waste reduction strategies (see section 3.2.3). Addressing these operational and policy barriers could significantly improve the prioritisation of donation as an end-of-shift practice.

3.2.3 Limited staff agency as a root cause of hotspots

Limited decision-making agency among staff emerged as a root cause of back-of-house food waste hotspots during the QSR site visits. Kitchen staff, as the individuals who directly handle food, are naturally more associated with food waste at the store level. While kitchen staff may contribute to waste through errors, attributing food waste solely to their actions would be an oversimplification. Ultimately, food waste at the store level is linked to decision-making processes that extend beyond kitchen staff to management at both the store and corporate levels. The actions of kitchen staff are largely dictated by managerial decisions, while store managers themselves operate within a framework of rigid corporate directives (Butler and Hammer 2019).

Corporate directives include strict adherence to shelf-life guidelines and the use of a digital back-of-house management tool for key operational processes. Staff are directed to follow AI-generated forecasts provided by the digital tool for stock ordering and food pre-preparation, with the expectation that compliance will minimise waste. The underlying logic is that food waste equates to financial loss, so resource efficiency a business priority. While these processes aim to balance efficiency with food safety, they are inflexible and unable to account for external variables such as real-time fluctuations in demand, presenting operational challenges. Situations therefore arise where AI-generated forecasts are sometimes inaccurate and an excess of surplus food is pre-prepared. Experienced managers and staff may deviate from these predictive models based on their judgment, yet such deviations carry the risk of criticism if outcomes are unfavourable, placing employees in a difficult position. Rigid corporate directives ultimately reduces staff incentive to engage actively with food waste reduction, as adherence to the prescribed guidelines and system largely absolves them of responsibility for food waste. This situation highlights a misalignment between ideals at a corporate level and the realities at a store level.

At a corporate management level, the implementation of digital back-of-house management tools can be rationalised when considering the stereotypical view of the QSR workforce. That is, young employees working their first job, with limited experience and lower skill levels (DiPietro and Pizam 2008; McAdams et al. 2019). Such a view can lead management to perceive that a significant portion of food is wasted due to employee error, despite the highly managed or ‘automated’ environment of a QSR (McAdams et al. 2019). However, the QSR workforce is diverse and may include staff undertaking studies in highly skilled areas (Butler and Hammer 2019), challenging the extent to which so-called ‘low-skilled’ staff truly contribute to waste. Even so, high turnover rates in the sector reinforce a sector-wide corporate rationale for standardising back-of-house processes (Butler and Hammer 2019; DiPietro and Pizam 2008). Implementing a digital back-of-house management tool could be a way for corporate management to ensure a high baseline of consistency and quality in the operations. This reasoning also applies to corporate issued shelf-life guides and recipes, especially for a multinational QSR chain. However, this mode of operation runs at the risk that longer-term staff experience feelings of micromanagement or even alienation (DiPietro and Pizam 2008) — especially given the extent of back-of-house operations based in the digital management tool. The use of technology to improve efficiency and reduce food waste is a major theme in the QSR literature. However, there is a fine line between management and overreach, so any potential concern by staff is warranted. An industry publication promoted a tool that enables managers to conduct surveillance or remote video audits of staff performance (QSR Web 2018), raising privacy concerns over potential misuse and the erosion of workplace trust. There is also research on robotics technology that can augment the cognitive capacity of QSR kitchen staff (Noone and Coulter 2012). Such technology raises broader concerns about reduced staff autonomy and deskilling in a work environment that has been compared to an assembly line (DiPietro and Pizam 2008). While technological innovations play an important role to support QSR operations, it must be balanced with respect to staff autonomy, ethics and agency.

Introducing operational protocols that allow staff to adapt based on real-time conditions could help to reduce back-of-house food waste in QSRs. These protocols could be supported by increased staff training focused on food waste (see section 3.2.4). Empowering staff to make informed decisions when predictive systems prove inaccurate could help bridge the gap between corporate ideals and store-level realities. By incorporating greater flexibility into store-level decision-making, QSR establishments could strengthen their food waste reduction strategies and improve staff engagement.

3.2.4 A focus on operational efficiency over food waste as a root cause of hotspots

A focus on operational efficiency emerged from the results as a structural barrier contributing to back-of-house food waste in QSRs. Staff follow standardised procedures and operational systems designed by corporate management to optimise back-of-house processes (Butler and Hammer 2019). This optimisation refers to rapid service and resource efficiency. That is, a maximised conversion rate from stock (food ingredients) to sales (customer orders) through quick service. The QSR chain (subject to the site visits) provides staff training that is primarily focused on basic back-of-house operational processes and protocols. The training on processes and protocols concerning operational efficiency have been mentioned by staff as relevant to minimising food waste. However, there is no training module that focusses specifically on reducing food waste. This means that food waste is treated as an operational inefficiency, emphasised in the way that food waste is documented and categorised at the store level. Waste tracking systems typically log discarded food as an operational cost rather than an issue requiring active intervention. This is not to discount the importance of measuring food waste as a tool to help food service businesses (including QSRs) track and reduce waste (WRAP and Guardians of Grub 2020). Rather, the lack of differentiation in reporting inadvertently disincentivises food waste prevention initiatives such as donation, as managers focus more on adhering to financial and inventory control targets than actively diverting surplus food from landfill. There is an opportunity to restructure waste reporting frameworks to explicitly account for diversion efforts such as donation, ensuring that food waste reduction is recognised as a distinct priority rather than solely an efficiency or financial metric.

Efficiency is essential for ensuring rapid service, but prioritising speedy service for increased sales can come at the expense of reducing food waste. The pressure on staff to prepare orders quickly and meet sales targets can lead to mistakes and dropped food. This may be a side effect of expecting staff to meet operational targets that can be unrealistic (Butler and Hammer 2019). This may also be a side effect of the commodification of food in the QSR industry, where staff trained in standardised operating procedures are implicitly expected to work in a machine-like manner (DiPietro and Pizam 2008; McAdams et al. 2019). Such a high-pressure work environment underscores a fallacy that food waste can be minimised in QSRs though a sole focus on improving operational efficiency. A shift in focus is needed, where efficiency is paired with an adaptive, situational approach driven by staff awareness and agency in decision-making.

The importance of staff training as a way to reduce food waste is underscored in the literature. Improved staff awareness of the environmental and financial implications of food waste can positively influence waste management practices (Hanson and Mitchell 2017; Martin-Rios et al. 2018). Expanding staff programs beyond basic operational processes to include food waste reduction techniques would enhance store staff understanding of the broader impact of waste and potentially lead to greater action. This is relevant to donation programs; section 3.2.2 highlighted inconsistencies in staff awareness regarding corporate-endorsed food donation initiatives. If food waste-focused training can be integrated into standard staff training, stores would be better equipped with knowledge to participate in food donation. This, of course, does not solve other existing challenges concerning aging equipment and limited space. Nonetheless, food waste focussed training would ideally enable staff to make sensible judgment from experience, not just a blind following of protocols. Such training could also help to shift the focus away from operational efficiency, encouraging staff to recognise food waste as a separate issue to focus on. While operational efficiencies can reduce food waste, it is different from a focus on sustainability. Without deliberate intervention, food waste reduction efforts remain subordinate to financial and productivity metrics. Such change would require support from the corporate management level, challenging existing organisational structures and perceptions over the role of staff at the store level. There is an opportunity for corporate management to integrate food waste reduction as a key component of operational decision-making; the effects of change ideally flowing down to staff at the store level.

4. Recommendations

Recommendations for addressing back-of-house food waste in QSRs have emerged from the data analysis. These recommendations are presented in alignment to the food recovery hierarchy (Fight Food Waste CRC 2019).

4.1.1 Balance processes and protocols with staff agency in decision-making

There is an opportunity for corporate management to recognise the value of adaptive, real-time decision-making by staff at the store level. While standardised operational process, protocols and digital back-of-house management tools remain a necessary and valuable resource in QSR operations, their limitations in accounting for real-time variables should be acknowledged even though they are designed to optimise efficiency and reduce waste. Processes, protocols and technologies should be designed to assist staff, not replace the experience and situational awareness of staff. Rigid, blind adherence prevents this; staff may view food waste to be seen as a matter of process and not something that should be actively prevented. A revised approach would balance processes, protocols and digital predictions with staff agency in decision-making. Staff would be empowered with greater autonomy to apply judgment in the amounts of stock ordered and food pre-prepared, especially when digital predictive systems fall short. Increased staff autonomy would be supported by increased staff training specific to reducing food waste. Such an approach helps to lay groundwork that prioritises food waste prevention, the most ideal option according to the food recovery hierarchy (Fight Food Waste CRC 2019). Within this context, there is an opportunity for corporate management to engage with store staff and store managers to understand the complexities of day-to-day QSR operations and co-design solutions to reduce food waste.

4.1.2 Implement staff training specific to food waste

There is an opportunity for QSRs to implement staff training that is focussed specifically on food waste awareness and prevention. This would help address an issue where food waste reduction is not explicitly addressed within existing training frameworks. While the site visits identified that staff already undertake training on back-of-house operational processes, and it is implied that following these processes will minimise food waste, this is different from training that specifically focusses on food waste. Food waste training could be delivered through dedicated training modules within the staff management portal, where staff already undertake training. An integration into existing workflows and consistency of access across store locations could encourage greater uptake of this training.

There is an opportunity for food waste training to highlight how, specifically, certain operational processes can help to reduce food waste. A shift from emphasising *what* the processes to the *why* the processes matter could reduce instances of staff blindly following back-of-house processes. Equipping staff with the knowledge to be more thoughtful and intentional when they act is an important part of supporting staff agency in decision-making processes to reduce food waste. To align end-of-shift practices more closely with the food recovery hierarchy, there is also an opportunity for the food waste training to emphasise prevention as the first priority. This would be followed by best practices for managing surplus food, such as recognising donation-eligible items and safe donation of surplus food, with disposal as the last resort. Enhanced training would help to address knowledge gaps while fostering a workplace culture where reducing food waste is an integral part of operational processes.

4.1.3 Expand food donation program

There is an opportunity for food donation programs to be expanded within QSRs, to manage surplus food that is safe for human consumption. For corporate-endorsed food donation initiatives, there is an opportunity to improve staff awareness for the initiative and provide a guide for how to become involved. The topic of food donation could be a learning module that is part of food waste specific staff training. This would help to address current inconsistencies in staff awareness and how these programs are implemented across different store locations. Aside from staff awareness, motivation is another key factor. Currently, surplus food is logged as waste in daily reporting systems, whether it is disposed of or donated, reinforcing the perception that food loss is simply an operational cost rather than an opportunity for redistribution. There is an opportunity to shift that perception by creating a waste diversion or donation-specific category in waste reporting.

Additionally, operational adjustments, such as diversifying donation-eligible items and improving donation infrastructure, could increase uptake. Expanding donation eligibility beyond certain cuts of chicken to include a wider range of menu items would reduce the amount of safe, nutritious food that is disposed. Finally, adopting consumer-facing apps — such as Too Good To Go — as part of an integrated waste management strategy, could both reduce surplus and enhance consumer engagement (Too Good To Go 2024; Vo-Thanh et al. 2021). Such apps could incentive stores to reduce food waste being disposed because discounting or donating surplus food would mean additional sales and reductions in waste disposal costs. By prioritising donation over disposal, QSR establishments can ensure that safe and nutritious surplus food is directed toward donation rather than disposed, contributing to sustainability.

4.1.4 Improve digital systems and physical infrastructure

There is an opportunity to tweak the digital systems and maintain the physical infrastructure used by QSRs to better support minimising food waste, given the significant role they play in back-of-house processes and customer orders. It would help to address a collection of issues mentioned by staff at the visited sites as contributing to back-of-house food waste, that they felt unable to change. For instance, addressing physical infrastructure challenges such as aging equipment is critical for supporting daily operations in addition to reducing food waste. Issues such as power cuts and malfunctioning cooling equipment are food safety issues that exacerbate waste. Regular equipment maintenance or replacement where necessary, supported by higher management, would minimise these risks and ensure stores are equipped to manage surplus food more effectively.

In addition to maintaining physical infrastructure, there are opportunities to tweak the back-of-house digital management tools and the point-of-sales systems used by QSRs. Though it is acknowledged that modifications to these systems may not be entirely within the control of QSRs, feedback can be passed to the companies developing these tools, given they have been advertised as a solution to minimise waste (QSR Media AU 2022a). Enhancing forecasting algorithms to integrate real-time data could improve demand forecasting accuracy in QSRs and reduce surplus pre-prepared food (Groene and Zakharov 2024). Improving the communication functionality of the point-of-sales system could enable QSRs to be notified when online delivery platform orders are cancelled. For waste reporting in the digital management system, creating a separate waste diversion or donation-specific category would help to set donations apart from waste that is thrown out.

Addressing these digital and physical infrastructure challenges would strengthen QSR operations, reduce food waste, and enhance sustainability practices. While certain changes may require collaboration with external stakeholders, these improvements would position QSRs for longer-term operational success.

5. Conclusion

This study examined back-of-house food waste in QSRs, using site visits and interviews with store managers at a multinational QSR chain to identify key hotspots and root causes. The analysis revealed that the pre-preparation and service stages were key food waste hotpots. The root cause analysis suggests that food wasted during these stages is not an unavoidable outcome of operations, but rather a consequence of rigid management frameworks and a focus on operational efficiency over sustainability. The findings also underscored the impact of limitations of digital forecasting tools, limited staff agency, and inconsistencies in the food donation program in contributing to food waste.

Addressing these challenges requires a flexible approach to bridge the gap between corporate ideals and store-level realities. This includes balancing standardised processes and strict protocols with staff agency in decision-making. Additional steps QSRs can take to minimise food waste include refining digital forecasting tools, expanding food donation programs, and introducing staff training specific to food waste. Reducing food waste in QSRs ultimately requires a shift in organisational priorities; one that positions sustainability as integral to operational strategy. By embedding waste prevention initiatives at all levels of management, QSR chains can foster long-term financial and environmental benefits for sustainability.

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Appendix A1 – Site Visit Process

Site Visit Process Guide

(1) **Meet manager: Initial conversation to build rapport & introductions** (5-10 mins)

- Meet manager and show university ID card to verify identity.
- Manager to introduce researcher to staff. Clarify that the research purpose is to understand food waste. (Bring plain language statement.)

(2) **Conduct interview** (approx. 30 minutes).

- See separate interview guide.
- Can follow the interview guide or tweak questions to follow-up on observations.

(2) **Walk through of kitchen and observation** (full shift – 3 hours)

- Manager to bring researcher into kitchen for a walkthrough and introduce the layout, for an overview of what process happens in which section
    - For each section of kitchen / process viewed, ask if food waste occurs.
    - Make a sketch of this layout and note the different stations.
    - Take a photo of fire escape plan as this often has the general store layout.

Note / photograph visible waste. Opportunity to ask high level questions about waste. drivers/solutions/barriers in each section, briefly. Bear in mind we want to keep disruptions to a minimum and that there will be a post-observation interview.

- **View process of food entering site**

- **View process of how food is stored** – dry goods and chiller.
    - Do they rotate stock?
    - Any cold chain issues?

- **View process of food preparation**
    - How much is prepared from scratch vs pre-prepared in packets?
    - Are there scraps/ mess that is thrown out?
    - Take note of the system that feeds orders to staff – is there a different process for dine in vs takeaway/app orders?

- **View service-ready items**
    - Is food thrown out after x time / temperature?

- **Look in the bin / take photo**
    - How many bins are there?

Appendix A2 – Interview Guide

Section	Topic	Question	Follow up
Section 1:	About employee role	Q1. To confirm, what is your name, where you work and your role?	
		Q2. What is your main role in the business?	Can you describe this role?
		Q3. Have you held any other roles in this business?	
		Q4. How long have you been employed in the business? *(months/years)*	
		Q5. What best describes your employment status? *(casual, part-time, full-time, etc)*	
Section 2:	Food Waste	Q6. What is considered food waste in this store?	
		Q7. How would you rate your overall concern for food waste in your business?	
		Q8. How would you rate your QSR restaurant's management of food waste overall?	
		Q9. Does your business track and report food waste on site or in general?	If yes, how? (*e.g., pen and paper, scales, compare stock with sales)*
			If yes, are there targets or KPIs?
		Q10. What happens to food waste generated within your business?	*(e.g. landfill, composted on site, recycled on site, etc)*
Section 3:	Product and Process / Stage	Q11. Can you describe what happens during the different process or stages of how food is handled at your business?	*(e.g. from when ingredients are ordered, delivered and stored, to when they are then prepared and served to customers)*
		Q12. Does food waste occur at any of these specific stages and why?	Do you think a specific stage generates more food waste?
			How much food waste would you say is generated at this stage?
			Does your business track food waste by stage? (If so, how?)
		Q13. Specifically, what foods are wasted at each stage?	Which of these foods are ingredients and which are prepared food items?
			What specific foods would you say are the most wasted overall?
			How much of these ingredients or prepared food items would you say is wasted?
			Does your business track food waste by specific food items? (If so, how?)
		Q14. Do you think there is a connection between what specific foods are wasted and when/what stage this food is wasted?	If so, why?

Section 4:	People or Staff	Q15. How does your current role at work have influence on food waste at your business?	How about other roles across the business?
			Are employees encouraged or empowered to report food waste?
		Q16. What role do you think business processes or employees following protocols has on food waste in your business?	What are these protocols?
			How much food waste do you think is generated in the business due to these protocols?
			What influence does a store manager have on the menu?
			Does your business track this food waste?
		Q17. Has the business has provided to you any staff training about reducing food waste?	Who provided this training and how long did this training last?
			What format was this training provided?
			Did this training cover specific processes?
			Do you think this training has been useful and why?
Section 5:	Reducing food waste	Q18. What is the main factor you think that contributes most to food waste in your business?	Are there company policies that enable or inhibit reducing waste?
			Who at the site has more control over reducing waste, management or employees?
		Q19. Can you describe any processes your business currently has in place to reduce food waste?	How effective do you feel these processes have been to reduce food waste?
			Is there a food waste manager position in your company?
			Is there any discounting or donation of surplus food?
		Q20. How else do you think food waste can be reduced in your business?	
		Q21. Is there anything else you would like to mention in relation to food waste in QSRs?	

Appendix A3 – Site Visit Observations Guide

Site Visit Observation Guide

1) General questions to the manager

- How long has this store operated for?
- What is the number of staff working at the store?
- Is the time of this visit considered peak or off-peak?
- What number of shifts are there per day? What times does the shift (of this visit) run for?

2) About the business

- Business name, suburb and state
- What best describes the business structure? (*e.g. independent business, chain, franchise*)
- What are the opening hours of the business? (*days and hours)*
- What is the main cuisine type served in the business?
- What is the main product type served in the business?

3) View process of ingredient ordering, delivery and storage

a) Processes

- How does the store determine how much product is needed?
- What is the delivery process?
    - Where are the food ingredients delivered / who picks it up?
    - How often are there deliveries? Do they occur over shift changes?
    - Are there food ingredients arriving onsite that is unfit to eat?
- What is the storage process?
    - Who oversees unpacking deliveries?
    - Where / How are items stored?
    - Are there items that are de-packaged immediately post-delivery? vs items that are left in packaging until they are needed?
    - Does food packaging help or hinder reducing food waste?
- How is stored food managed?
    - Are items pre-labelled?
    - Who labels items as they are coming in?
    - Is there a FIFO (first in, first out) process?
    - How do you determine if food is no longer fit for being used in a meal at this stage? What happens to this food? (donate?)

b) Staff

- Does human error contribute to waste at this stage
    - e.g. If staff leave a fridge door open, label items incorrectly
- What kind of training of staff occurs at this stage?
    - Do managers get further training on reducing food waste?

c) Technology

- Are there apps used at this stage for tracking food items
- Is there any predictive technology used at this stage to influence stock ordering or storage

d) Equipment/ infrastructure

- Are there equipment malfunctions that generate waste at this stage?

4) View process of food preparation

a) Processes

- Where does food first enter the preparation area?
- How do you know how much food to prepare?
    - Are there predictions of when a busy period is expected to be?
- What is food preparation?
    - Is food prepared from scratch (e.g. cutting lettuce) or assembly or pre-prepared ingredients?
    - Are there certain items that need more preparation than others?
- What processes are in place to reduce waste?
    - Are there menu items that use different parts of the same ingredient, in line with nose to tail cooking?

b) Staff

- Who is determining how much food to prepare?
- Does human error generate waste at this stage?
- What training do staff get at this stage, particularly on minimising waste?
- Are staff empowered to report food waste at this stage?

c) Technology

- What technology being used to predict what/when to prepare food?
- What technology is used to augment food preparation?
    - Are there timers that tell you when to start prepping?
    - Are there automated cooking items?

d) Equipment/infrastructure

- Do equipment malfunctions generate waste? – i.e. cooker is unreliable.
- Are there machine guards in place that help with reducing waste?
- Is there equipment or a system used to measure waste?

e) General

- Is food waste measured at this stage?
- How does food waste typically occurs at this stage?
    - i.e. product falls on the floor, staff make the wrong order etc.
- What type of foods are wasted at this stage?
- Is there signage here that enables food waste reductions?

5) View service-ready items

a) Processes

- How long can items be in the service-ready section?
- If someone orders food and doesn't collect it what happens?
- How long can fries/chips sit in bain-marie after they have been cooked?
- How long can proteins be stored for?

b) Staff

- What kind of training do staff get at this point?

- Are staff encouraged to reduce waste at this stage?
- If staff notice lots of waste occurring at this stage, how do they go about bringing raising it with management?

c) Technology

- Are there technologies in this section that can help reduce the waste generated at this stage
    - i.e. apps for donation or discounted purchase

d) Equipment/infrastructure

- Is there equipment in this section that can help reduce waste?
    - i.e. equipment that keeps product at a safe temperature for longer
- Is there equipment or a system used to measure waste (i.e. digital software)?

e) General

- Is there any food donation from this point?
- Is food waste measured at this stage?
    - How? Some businesses will place food into bucket which is then weighed at the end of the day
- Is there signage here that enables food waste reductions?

Appendix B – Comparative Analysis of QSR Site Visits

Site context

	Site A	Site B	Site C	Site D
Store location	In a shopping centre Next to cinema and other food stores but not in food court. There is a cinema nearby.	In a shopping centre Next to other food stores as part of a food court. There is a cinema in the shopping centre.	Standalone store Street front. Located on a busy thoroughfare for multiple suburbs in the south-east There is a cinema nearby.	Standalone store Street front. On a busy main row with many shops, including other food establishments.
Store type	Corporate owned	Corporate owned but was a franchise	Corporate owned	Corporate owned and is the flagship store. They train many staff here. Corporate will also test recipes.
Opening hours	Mon-Sun 11am-10pm	Mon-Wed 10am–8:30pm & Thu-Sun 10am-10pm	Mon-Sun 11am-10pm	Mon-Sun 11am-10pm
Peak times	11am-2pm 6pm-9pm	10am-2pm	11am-2pm 7pm-10pm	11am-2pm 9:30pm
Interview with	Assistant manager. Full time, started in this role 1.5 years ago. Previously worked at another QSR	Assistant manager. Full time, started in this role 2 years ago.	Assistant manager. Full time, started in this role 2 years ago. Previously worked at another QSR branch (Site B store)	Assistant Manager.. Full time. Has worked at the store for 2 years. Stared as a regular employee.
Also talked to	Other staff on the shift	Three other employees who work the kitchen	Other staff on the shift	Manager and two part time employees who work the kitchen
Staff numbers	18-20 on rotation, with 4-5 working at a time.	45-50 on rotation, with 10 during the day and 5 in the evening.	20 on rotation, with 3-4 working at a time	20 on rotation, 8 working at a time. 2-3 full time management staff and 4-6 part time
Main products	Main cuisine is flame-grilled chicken. Main product is burgers and wraps			
General store layout	• Each store has back-of-house food preparation and storage area, ordering counter, and front-of-house dining area. For stores operating in a shopping centre, this dining area separate to the food court and akin to a restaurant. This means that shopping centre and standalone stores have a similar vibe. • The emergency evacuation procedure shows the store floorplan — each store is different. • Corporate issued visual guides showing the layout of the food storage areas and work benches			
Other details	• Each store refers to a corporate issued “shelf-life guide” that provides details for each food category and specific item-type served by the store. • There is a corporate issued guide on what items should be disposed in which bins, be it organics, recyclables, or general waste. • Staff at shopping centre stores rely on private / centre operated waste facilities. Staff at standalone stores rely on council operated waste facilities. • Operational processes are affected by the space that the store has: frequency of chicken deliveries, whether there is an organics waste bin, what is donated vs thrown away.			

General view of food waste

What is considered food waste

The staff at the QSR locations viewed food waste in different ways, depending on whether it was from a technical perspective or from a business perspective. From a technical perspective, the staff referred to food waste as food thrown into the bin. This generally comprised of food that was considered unfit or unsafe to serve to consumers. From a business perspective, food waste took a broader definition and referred to food that was unfit to sell or surplus. That is, unsold or 'wasted' food is waste money. This included ingredients past the supplier shelf life date and prepared food past the hot holding period. It is at the discretion of management how these foods are disposed of — given away (to staff or charity) or disposed into the bin.

Attitude toward food waste

	Training to reduce food waste	Attitude toward food waste	Overall comments
Site A	No real training for employees or managers on reducing food waste other than following Macromatix system. However this system is not always accurate and staff are directed by higher management to follow it. No identifiable incentives for reducing food waste	Perception is that the store is busy and little waste occurs in general. The store has no concrete food waste reduction goals in place. The decisions to cook more or less food than indicated by the forecasting software are primarily made by the manager or assistant manager, but kitchen staff also contribute to decision making. Assistant manager was concerned about food waste and thinks that it is a shame that food is no longer donated, but felt unsure how to restore the donation system.	Lack of training overall that is specific to reducing food waste. However the perception by some manager is that the general training modules already provided to staff are sufficient, and that staff need to follow protocols. All of the interviewed managers appeared eager to reduce food waste in the store but had varying degrees of agency to do so. The assistant manager with the greatest amount of agency worked at the head office restaurant and leads the chicken donation program at his store and 8 other stores. In contrast, another interviewed assistant manager expressed that he did not know his store could participate in the food donation program and did not like to throw the chicken out. There may be an opportunity to develop a training module on reducing food waste, specifically aimed at the management staff. The training module would help ensure that there is better consistency of knowledge across the board of best practice food waste reduction practices. It could also highlight the company wide food (chicken) donation program
Site B	Assistant manager received no proper training on reducing food waste other than required knowledge of back-of-house processes and store workflow No real training for employees or managers on reducing food waste other than following MacromatiX system	The store manager is eager to reduce food waste. He has led the staff to do so significantly in the 2 years he has been in his role. His perception is that staff following the MacromatiX predictive forecast is key to reducing food waste. Still, there is a fair amount of food waste (chicken) that is donated to the charity partner.	
Site C	Assistant manager received no proper training on reducing food waste other than required knowledge of back-of-house processes and store workflow No real training for employees or managers on reducing food waste other than following Macromatix system. However this system is not always accurate. No identifiable incentives for reducing food waste	Perception is that the store is busy and little waste occurs in general. The store has no concrete food waste reduction goals in place. General staff attitude seemed to be indifferent about food being wasted. Assistant manager was concerned about food waste but felt unempowered by Head Office procedures (didn't want to comment further).	
Site D	They have general back of house training courses on Workday tailored to the staff position. There is one on food safety and also another on reporting waste. However there is not a food waste specific module. The assistant manager believes that when staff follow company procedures in handling and preparing food, waste is minimised. These procedures are outlined in the Workday courses.	The manager and assistant manager are proactive about reducing food waste. The store aims to waste no more than $50 per day, and they generally meet this target. The assistant manager especially plays a big role in reducing waste, being an ambassador for a social change for good program in the company. This includes food donations. Thinks that food donation isn't reducing waste, but repurposing. View that food waste is minimised when employees follow protocol. This is the head office restaurant.	

What happens food that cannot be sold or is unfit to eat

	Staff eat	Donated	Binned	Tracked/recorded	Other comments
Site A	✕	✕	✓	✓	Store used to donate food but no longer does. At least not in the 1.5 years the assistant manager has worked at the store, and he is unsure why.
Site B	✕	✓	✓	✓	The store manager is eager to reduce food waste and has led the staff to do so significantly in the 2 years. There is a weekly review / stock take process to track stock levels and wastage, ensuring stock levels are within acceptable ranges.
Site C	✕	✓	✓	✓	No compost bins so everything goes to landfill. This includes edible food like unsold chicken pieces and incorrect orders. Donated food is limited to half and whole chickens.
Site D	✓	✓	✓	✓	This is the head office store and the management there seem the most empowered to reduce waste. This includes cooking chicken that is about to expire to give to staff and local businesses to eat — not something that other stores would do. The assistant manager is an ambassador for social change and helps 8 other stores with the chicken donation program.

Account of food wasted during back-of-house processes

Process flowchart

(1) Stock ordering → (2) Stock delivery → (3) Stock storage & rotation → (4) Pre-prepare menu items → (5) Preparing & serving customer orders → (6) End-of-shift practices

		Site A	Site B	Site C	Site D
(1) **STOCK ORDERING**	**Process description** ↓	Ordering, site storage and food prep is primarily centred around a company-wide app the QSR business uses, called MacromatiX. It provides real-time monitoring of stock levels and sales in the store. Managers send a spreadsheet of this data to HQ at the end of each week.	Ordering, site storage and food prep is primarily centred around a company-wide app the QSR business uses, called MacromatiX. It provides real-time monitoring of stock levels and sales in the store. Managers send a spreadsheet of this data to HQ at the end of each week.	Ordering, site storage and food prep is primarily centred around a company-wide app the QSR business uses, called MacromatiX. It provides real-time monitoring of stock levels and sales in the store. Managers send a spreadsheet of this data to HQ at the end of each week.	Ordering, site storage and food prep is primarily centred around a company-wide app the QSR business uses, called MacromatiX. It provides real-time monitoring of stock levels and sales in the store. Managers send a spreadsheet of this data to HQ at the end of each week.
	Issues and food waste	The system uses data from previous years to make stock estimates, but this is not always accurate, as external influences can significantly impact sales. These influences are beyond what the system can predict, like the popularity of a movie at the nearby cinema on a sunny day. Management team must use common sense and experience with store and customer fluctuation to accurately predict customer levels. The decisions to cook more or less are primarily made by the manager or assistant manager, but kitchen staff also contribute to decision making.	The system uses data from previous years to make stock estimates for certain times and certain days, and unlike other stores the assistant manager claims that this accurate. Unlike other stores, the assistant manager claims that food waste stems from the staff not following the system / preparing the amount of food that the system predicts the store will sell. This could be due to the store having a more consistent pattern of sales, and that the location is located in a major shopping centre.	The system uses data from previous years to make stock estimates for certain times and certain days, but this is not always accurate, as external influences can have a big impact on sales. These are influences beyond what the system can predict, like the popularity of a movie at the nearby cinema. Management team must use common sense and experience with store and customer fluctuation to accurately predict customer levels.	The system uses data from previous years to make stock estimates for certain times and certain days, but this is not always accurate. The manager claims that the system sometimes underpredicts. Management team must use common sense and experience with store and customer fluctuation to accurately predict customer levels.

		Site A	Site B	Site C	Site D
	Other Comments	• All stock is ordered through the MacromatiX system, which has a customer forecasting system that can predict how much stock should be ordered. However, management have discretion to modify how much is actually ordered. • The overall stock ordering and delivery process is similar across most of the sites, with management staff ordering and receiving stock during the shift.			
(2) STOCK DELIVERY	**Process description** ↓	Chicken daily delivery, vegetables and non-protein items every 2-3 days	Chicken daily delivery, vegetables every 2-3 days, 'five ways' delivery Chips/Bread/ Drinks) 4 times a week	Chicken daily delivery, vegetables and non-protein items every 2-3 days	Three suppliers deliver outside of business hours (chicken, frozen/dry, salads)
		Deliveries received by Assistant Manager or Manager. Chicken in ~70-piece bags.	Deliveries unloaded at the dock and wheeled to the staff area. Invoices handed to the manager. Food goes straight into the cool room.	Received by Assistant Manager or Manager. Chicken in ~70-piece bags.	Suppliers have keys to access the site and deliver directly to the cool room. Relies on trusting the delivery people that the food is at correct temperature when delivered.
	Issues and food waste	Cos lettuce arriving in state not fit to eat. Managers decide whether to thrown out. Most food delivered is fit to eat.	No issues raised in this process	Vegetables were previously arriving in state not fit to eat, but they have now changed suppliers.	There are some issues with delivery drivers/staff leaving cool room door open. Fortunately, the generator is very strong and keeps the cool room at temperature (there is a temperature monitoring device), so it has not resulted in food waste. There are signs to remind everyone to shut the cool room door.
	Other Comments	• The overall stock ordering and delivery process is similar across most of the sites, with management staff ordering and receiving stock during the shift. One store stands out in that a third party supplier delivers stock outside of business hours. • Delivery frequency depends on store size and how busy it is. All sites, including Site B, receive daily chicken deliveries, typically pre-packaged and pre-marinated. At Site B, other food items such as vegetables and drinks are delivered on set days of the week. For the other sites, vegetables and non-protein items are delivered every 2-3 days.			
(3) STOCK STORAGE & ROTATION	**Process description** ↓	Food is stored in its packaging either in fridge, freezer or on shelf. Products are labelled on arrival with name, arrival date and 'use by'. Staff were unable to clarify any course for the use by dates other than Head Office (HO) supplied information	Food is stored in its packaging either in fridge, freezer or on shelf. Products are labelled on arrival with name, arrival date and 'use by'. The cool room door has a food shelf life guide on it, which details how every food item must be handled by stage: unopened packets, opened, cooked.	Food is stored in its packaging either in fridge, freezer or on shelf. Products are labelled on arrival with name, arrival date and 'use by'. Staff were unable to clarify any course for the use by dates other than Head Office (HO) supplied information	Food is stored in its packaging either in fridge, freezer or on shelf. Products are labelled on arrival with name, arrival date and 'use by'. The staff do a weekly stocktake
		Stock is rotated using the FIFO principle and manufacturer guidelines. FIFO does not apply to the drinks fridge at the front (cycles through quick enough that this is irrelevant). There is also a corporate issued shelf life guide for all food items, determined by the status of raw/cooked, sealed/opened package, time and temperature.	Stock is rotated using the FIFO principle and manufacturer guidelines. There is also a corporate issued shelf life guide for all food items, determined by the status of raw/cooked, sealed/opened package, time and temperature.	Stock is rotated in the storage area using the FIFO principle and manufacturer guidelines. FIFO does not apply to the drinks fridge at the front (cycles through quick enough that this is irrelevant). There is also a corporate issued shelf life guide for all food items, determined by the status of raw/cooked, sealed/opened package, time and temperature.	Stock is rotated using the FIFO principle and manufacturer guidelines, a per company policy. There are signs reminding staff to use open packs first. FIFO does not apply to the drinks fridge at the front (cycles through quick enough that this is irrelevant). There is also a corporate issued shelf life guide for all food items, determined by the status of raw/cooked, sealed/opened package, time and temperature.
	Issues and food waste	No reported issues with equipment malfunctioning or food waste at this stage.	No reported issues with equipment malfunctioning or food waste at this stage.	Staff reported quite a few issues with fridge and freezer malfunctions. In some cases, the freezer would stop cooling	Kale is delivered in 1kg bags and they were reportedly frequently wasted because they are only used in two

		Site A	Site B	Site C	Site D
		Staff report keeping food in packaging aids in reducing waste and ease of organisation Expired stock is wasted but this rarely happens		but the temperature gauge at the top wouldn't change, falsely signalling nothing was wrong. In cases such as these, staff had to resort to taking frozen goods to other nearby stores to prevent mass food waste. Food was also wasted due to power outages, including planned power outages where staff had missed a letter. Staff were unaware the store had a PO Box for physical mail Expired stock is wasted but this rarely happens	menu items. These menu items are salads, which few people order. Smaller 500g bags would be better however, the bags observed in the fridge was already 500g. Apparently the kale used to not be wasted because head office management used to frequently dine at the store (this was the flagship store) and they would order a lot of salad.
	Other Comments	• All sites use the Macromatix system for managing stock, tracking inventory, predicting demand, and generating waste reports. Although it provides predictive data, all managers acknowledge that it often underpredicts demand, requiring manual adjustments based on experience. • Each site emphasizes stock rotation, using a first-in, first-out (FIFO) method. All sites employ date labelling and this QSR business has developed their own labels that highlight each day of the week and capture other information. They are looking to bring-in label machines with timers to streamline this process. • There is a corporate-issued guide for where certain items should be stored.			
(4) **PRE-PREPARE** **MENU ITEMS**	**Process description** ↓	Most food is delivered pre-cut and either ready to cook or reheat. This includes precut and marinaded chickens, and pre-cut vegetables. Chickens are cooked for 30 minutes in a timed oven before being transferred to a heated tub. Some vegetables are prepared before opening (Tomato, Cucumber), others are cut to order (Avocado). Few limits to how long an item can wait under the heat lamps once prepared. Except fries – 5min — but the store is so busy that this is not an issue. Fries were only item to not be cooked to order during peak times.	Most food is delivered pre-cut and either ready to cook or reheat. This includes precut and marinaded chickens, and pre-cut vegetables. Aside from chicken, rice is also pre-cooked in the oven using pre-set programs. Chickens are cooked for 30 minutes in a timed oven before being transferred to a heated tub. Some vegetables are prepared before opening (Tomato, Cucumber), others are cut to order (Avocado).	Most food is delivered pre-cut and either ready to cook or reheat. This includes precut and marinaded chickens, and pre-cut vegetables. Chickens are cooked for 30 minutes in a timed oven before being transferred to a heated tub. Some vegetables are prepared before opening (Tomato, Cucumber), others are cut to order (Avocado). No limit to how long an item can wait under the heat lamps once prepared.	Most food is delivered pre-cut and either ready to cook or reheat. This includes precut and marinaded chickens, and pre-cut vegetables. Chickens are cooked for 30 minutes in a timed oven before being transferred to a heated tub. Some vegetables are prepared before opening (Tomato, Cucumber), others are cut to order (Avocado). They have two hours of prep time in the morning before opening the store to customers.
	Issues and food waste	Burnt food is wasted. Chicken is reportedly always the most wasted food, as the long cooking time and inaccuracy of the predictive AI system leads to an excess of cooked food. The decisions to cook more or less is primarily made by store management.	Anything dropped, burnt skins, peels are thrown out. The manager claims there is very little preparation waste. The MacromatiX system can be inaccurate in predicting customer numbers. Most waste occurs in the evening shift. Staff want to have food ready for customers and fear running out, so may cook too much. There is sometimes miscommunication around how much food is left. Chicken is reportedly the most wasted food. It was possible to view the amount of chicken wasted nightly as it was stored in the fridge for donation. Observed three tubs with whole chickens, chicken wings, and chicken	Chicken is reportedly always the most wasted food, as the long cooking time and inaccuracy of the predictive AI system leads to an excess of cooked food. The decisions to cook more or to cook less are primarily made by store management.	Prep scraps such as cucumber ends, skins, peels, chicken bones are put in an organic waste cady for composting. So is unused salad ingredients at the end of the day, anything dropped, burnt. Chicken is reportedly always the most wasted food. Food is thrown out after 4hrs or if hot food goes under 60°C temperature for food safety reasons. Temperature not really an issue as they have good cool room practices and a warmer to keep cooked foods sufficiently hot. The issue is really mostly time, when hot foods like chicken have sat too long in the warmer and cannot be sold.

		Site A	Site B	Site C	Site D
			tenders. More used to be wasted. Since starting his role two years ago, the assistant manager has led staff to reduce waste at the store by strictly following the production dashboard, i.e. cooking less.		Chicken ribs used to be able to be held for two day after cooking. They used to be precooked, chilled then reheated but this increased to risk of serving underheated food to customers. So now the ribs are cooked then held at temperature for 4 hours max.
	Other Comments	• All sites use the Macromatix system for managing stock, tracking inventory, predicting demand, and generating waste reports. Although it provides predictive data, all managers acknowledge that it often overpredicts demand (and less rarely underpredicts), requiring manual adjustments based on experience. It appears that most of the waste generated cooking too much food stems from this pre-preparation stage.			
(5) PREPARING & SERVING CUSTOMER ORDERS	**Process description** ↓	No separate system for take-away vs dine-in. Very few uber or take-away orders as based in Food court, so customers are predominantly dining in. Precooked food is transferred from hot holding trays to be grilled for service, on demand, to make customer orders. There are separate stations for salad and burgers/wraps. Food cooking times allocated to staff via recipes and instructions Staff use some technology to help with cooking time (times, alerts etc.) but most is done by eye of cook Sauces have been ordered in pre-squeezers that have instructions for a certain number of squeezes per recipe (similarly for salad scoopers and side ingredients	Unlike some of the other stores (Site C and Site A) there is a separate ordering system for take-away vs dine-in. Dine in orders are entered at the till but app order have their own tablet for each platform. Precooked food is transferred from hot holding trays to be grilled for service, on demand, to make customer orders. There are separate stations for salad and burgers/wraps. Food cooking times allocated to staff via recipes and instructions. Staff use some technology to help with cooking time (times, alerts etc.), especially for the ovens, but most is done by eye of cook.	No separate system for take-away vs dine-in. Quite a lot of service is take-away (through traditional ordering or through apps like Uber). No separate service process or heated area for waiting. No limit to how long a take-away item can wait under the heat lamps once prepared. Food can wait here for as long as necessary, even if Uber driver is late. Precooked food is transferred from hot holding trays to be grilled for service, on demand, to make customer orders. There are separate stations for salad and burgers/wraps. Food cooking times allocated to staff via recipes and instructions Staff use some technology to help with cooking time (times, alerts etc.) but most is done by eye of cook Sauces have been ordered in pre-squeezers that have instructions for a certain number of squeezes per recipe (similarly for salad scoopers and side ingredients	Unlike some of the other stores (Site C and Site A) there is a separate ordering system for take-away vs dine-in. Dine in orders are entered at the till but app order have their own tablet for each platform. Precooked food is transferred from hot holding trays to be grilled for service, on demand, to make customer orders. There are separate stations for salad and burgers/wraps. Food cooking times allocated to staff via recipes and instructions Staff use some technology to help with cooking time (times, alerts etc.) but most is done by eye of cook
	Issues and food waste	Wrong orders or slip-ups during cooking are reported as waste in the MacromatiX system and are composted Chicken is reportedly always the most wasted food, as the long cooking time and inaccuracy of the predictive AI system leads to an excess of cooked food.	Dropped food is a bigger cause of waste than prep-waste. It occurs when transferring food from the hot holding /freezer drawers to the cooking area, due to operation speeds to keep up with a high volume of orders. The store recently implemented a tech system called “zone”, which assigns each order to a zone. When front of house staff take the order from the pass to the customer, this increases the speed in which the correct order is identified and delivered. They store does not log or report consumer plate waste, only back of house waste.	Wrong orders or slip-ups during cooking are reported as waste in the MacromatiX system and are put in landfill. Staff reported no issues with cooking equipment malfunction or wasted food due to any technical errors Assistant manager reported a lot of food wasted during the late-night rush at 9pm (often happens yet unaccounted in the predictive system). This may be due to odd location of store. The decisions to cook more or to cook less are primarily made by management. Assistant manager felt bad throwing out this food.	Hot food wasted due to time x temperature reasons such as chicken and fries. Chips must be served within 10 minutes of leaving the fryer despite there being a heat lamp. Door dash won’t tell a restaurant if an order is cancelled, which can lead to waste. This “waste” is given to staff, so not technically wasted but logged into the system as wasted. At the end of the day, unused salad ingredients are put in an organic waste cady for composting. These caddies (and other bins) are emptied at an as needed basis.

		Site A	Site B	Site C	Site D
	Other Comments	• The food preparation processes are very similar across all the visited sites, a given since staff follow recipes and instructions provided by higher management. • There are variations in how orders are processed from food delivery apps, where some stores will have a separate tablet to take these orders.			
(6) **END-OF-SHIFT PRACTICES**	**Process description** ↓	Bins emptied twice daily (3:30-4 and at closing) – 2 sets of compostable bins (one in kitchen, one out back), 1 large recycling (paper only) and 2 landfill. Bins are emptied into larger waste bins in Plaza area (plaza does not accept bottle or plastic recycling so only paper and cardboard can be recycled) Daily end-of-day reports include wastage entered into Macromatix. Within waste, there are options for what, when (cooked, prepared, frozen, ready to serve), and how the food waste wasted. Items like overcooked chips entered by estimate weight. Specific items are reported in the manager chat. No donation processes.	At the end of the day, unused salad ingredients are put in an organic waste cady for composting. These caddies (and other bins) are emptied at an as needed basis. Daily end-of-day reports include wastage entered into MacromatiX. Within waste, there are options for what, when (cooked, prepared, frozen, ready to serve), and how the food waste wasted. Items like chips entered by estimate weight. There is a section in the reports for donations. That said, the company still counts this as a loss (financially), so this donated food is "wasted". Bins are emptied at an as needed basis during the shift. This is an involved process as two staff must wheel multiple trolleys and bins out to the shopping centre waste transfer station. There is space for processing food and organics waste that appears to be rarely used.	Bins emptied twice daily (3:30-4 and at closing) – 2 sets of landfill bins (two in kitchen, two out back), 1 large recycling (paper, glass and plastic). No option for compost. Waste entered into Macromatix is categorised into sales and waste. Within waste, there are options for what, when (cooked, prepared, frozen, ready to serve), and how the food waste wasted. Food waste report sent weekly to head office. There is a company program in place to donate chicken	Bin count: 1 bin in storeroom/ staff area, 5 bins in the kitchen. The bins are mostly filled with packaging waste, food handling gloves. Underneath the mountain of packaging in the bin there is some food waste. It's not meant to be there, but in the organics caddy. Bins are emptied at an as needed basis through the day, into a larger bin outside on a side street. This bin part of the council-operated waste service. There are issues with this bin becoming overly full before it is collected (every 2 weeks), with people on the street/ nearby businesses dumping rubbish. They have needed to lock the bin. There is a whiteboard listing the bin days (general, organics, recycling), to help staff keep track.
	Issues and food waste	Unsold food composted, not donated. Staff (assistant manager) unsure how to start donating food again as he is aware that the store used to donate.	It was possible to view the average amount of chicken wasted each night as it gets stored in the fridge for donation. What is shown is three tubs with whole chickens, chicken wings, and chicken tenders. There is a strict protocol for food donation**	Assistant manager reported that chicken is always the most wasted food, as the long cooking time and inaccuracy of the predictive AI system leads to an excess of cooked food in some instances No option to compost waste, possibly due to expense, so all food waste goes in landfill. There is a company program in place to donate chicken. However, the store only donates half and whole chickens as no space to store anything else and smaller pieces of chicken begin to degrade as they were cooked earlier.	All organics are meant to be thrown into the compost collection bin but some of this ends up in general waste and is not sifted out. The most visible food waste is plate waste, which staff said they do not track. Corporate cares about tracking back of house food waste, possibly because it represents wasted money. There is some element of discrepancy when it comes to stocktake due to the way the food ingredients are delivered and the information the logging system asks for. This means waste tracking is not totally accurate despite staff efforts.* Most items are logged by piece, but fries by estimated by weight (there is no scale), at approx. ½ a bag per shift
	Other Comments	• All sites use the MacromatiX system for managing stock, tracking inventory, predicting demand, and generating waste reports. Although it provides predictive data, all managers acknowledge that it often underpredicts demand, requiring manual adjustments based on experience. • Waste entered into MacromatiX is categorised into sales and waste. Within waste, there are options for what, when (cooked, prepared, frozen, ready to serve). And how the food waste wasted: Raw waste – raw; Damage/dropped stock – raw or cooked; Out of time/temp prep – raw or cooked; EOD (end of day) waste – cooked; Returned customer item – cooked; Inventory item is inactive; Reversals of incorrect waste entry;			

		Site A	Site B	Site C	Site D
		• *The chicken is in bags on plastic crates. Each bag is delivered by weight, with an averaged piece count used for stock-take. The piece count in the bags can vary, affecting what the digital system (reports to management) thinks is wasted. • According to the QSR consumer facing website, the chicken donation program started in 2017 and is global across their stores. However, some staff seem to not be aware about it. due to health and safety regulations. • ** The staff confirm that there is a strict protocol for food donation: Only cooked chicken is donated and items must be chilled. The charity partner will arrive and take a temperature check. Blue freezer bags are used by some stores specifically for donation. There are also sticky labels to note the date and temperature.			

Food process / handling stages associated with food waste

	Site A	Site B	Site C	Site D	Foods wasted	Reasons for waste	Potential opportunity
(1) Stock ordering	The MacromatiX system can be inaccurate in predicting customer numbers and thus, how much stock to order. Additional example of external factors that the system cannot predict.	No issues raised in this process	The MacromatiX system can be inaccurate in predicting customer numbers and thus, how much stock to order.	The MacromatiX system can be inaccurate in predicting customer numbers and thus, how much stock to order. However, the manager claims the system tends to slightly under-predict	No food directly wasted at this stage. But if the ordered stock is not used in time, waste can occur in later stages such as storage.	The MacromatiX system can be inaccurate in predicting customer numbers. There are external factors that the system cannot predict. Staff must rely on common sense and experience	Explore if the predictive AI system can be tweaked to better reflect the contexts of each store and the external factors affecting customer levels.
(2) Stock delivery	Most food delivered is fit to eat / serve, however there have been issues with cos lettuce being brown. This food wasted at the discretion of management staff	No issues raised in this process	Vegetables were previously arriving in state not fit to eat, but they have now changed suppliers.	Delivery drivers/staff leaving cool room door open. (It is an issue, but food was not wasted)	Cos lettuce brown when delivered	Poor quality vegetables were delivered.	Store has already changed suppliers for the vegetables
(3) Storage and rotation	Expired stock is wasted but this rarely happens. This includes expired vegetables. Lettuce has a short shelf life of 5 days.	Expired stock due to oversights in product rotate can lead to waste, but this rarely happens	Expired stock is wasted but this rarely happens Staff reported many issues with fridge & freezer malfunctions. The freezer would stop cooling, but the temperature gauge wouldn't change, falsely signalling nothing was wrong. Staff took frozen goods to nearby stores to prevent mass food waste.	1kg bags of kale too big to be used up. Even 500g is a bit too much given it is only used in two menu items that customers rarely order	Lettuce and other veg expired or degrading before it can be used up. Qty of kale and other veg in bags too much to be used in time. Fridge/freezer items Expired stock is wasted	Fridge and freezer malfunctions and faulty temperature gauge Planned power outage in area that staff were unaware of due to missed letter. Staff were unaware the store had a PO Box for physical mail Expired stock Packs of pre-cut veg too big	Review the pack sizes of pre-cut salad ingredients Support stores to have well maintained essential equipment. Support replacement equipment as needed.
(4) Food pre-preparation	Fries were only reported item to not be cooked to order during peak times. If excess fries are under heat lamp for longer than 5	Vegetable ends, peels, and dropped food is thrown in a organics waste caddy. Staff claim minimal waste occurs here.	The MacromatiX system can be inaccurate in predicting customer numbers and thus, how much food to pre-prepare.	Vegetable ends, peels, and dropped food is thrown in a organics waste caddy. Hot food wasted due to time x temperature	Any food that is dropped, including raw chicken Chicken is reportedly the most wasted food. (Incl. unsold	Dropped food Chicken is the most wasted food. The long cooking time + inaccuracy of the predictive AI system leads to excess cooked	Consider reinstating the practice of pre-cooking food for chilling to reduce waste. Consider cooking fries to order.

	Site A	Site B	Site C	Site D	Foods wasted	Reasons for waste	Potential opportunity
	minutes, they are wasted. Dropped food is wasted. Unsold food is thrown out, including chicken: whole, half, smaller pieces (wings, tenders) Most waste occurs in the evening shift.	The MacromatiX system can be inaccurate in predicting customer numbers and thus, how much food to pre-prepare. Most waste occurs in the evening shift. Staff sometimes overprepare and sometimes miscommunicate how much food is left.	Dropped food is thrown in landfill.	reasons such as chicken and fries. Chips must be served within 10 minutes of leaving the fryer despite there being a heat lamp. Chicken ribs used to precooked and held for chilled for two days. Now it is 4 hours 20-40 chicken tenders wasted a day (time x temp)	chicken due to time x temp) Chicken ribs, chicken wings, chicken tenders, Fries Prepared food that is surplus to what is sold to consumers by the end of the shift.	food. Sales are unpredictable. Staff not trusting the predictive AI system and cooking extra. Time x temp. of cooked food: chicken is 4hrs. † Excess fries not sold within a pre-determined period (10-min after frying, 5-min under heat lamp). Miscommunicatio n how much food is left.	Explore if the predictive AI system can be tweaked to better reflect the contexts of each store.
(5) Preparing customer orders	Dropped food and order errors are thrown in landfill	Most of the waste occurs due to dropped food when transferring from the hot holders up to the grill, due to the number of orders and speed in which the workers must prepare them.	Dropped food and order errors are thrown in landfill	Dropped food is thrown away Some delivery platforms do not tell the QSR that the customer cancelled the order. This is logged as waste in the system and then given to staff.	Any food that is dropped: raw/cooked chicken, sweet potato fries. Any food that is incorrectly prepared Whole orders	Staff must move quickly during rush hour to prepare orders: Dropped food; Order errors Orders through food delivery platform cancelled but food already prepared.	Allow staff to donate incorrectly prepared orders. Improve communication between ordering platforms and restaurants (this is on the ordering platform)
(6) End of shift	Food is no longer donated so it all goes into the organics recycling bin. When food was donated it was frozen and collected at the end of the week. Assistant manager unsure how to start donations again.	Food to be donated is frozen and collected by the charity partner at the end of the week	All waste, including food waste goes into the general bin. No facility to compost. Food donation program is limited to half and whole chickens. Smaller chicken pieces not donated. No mention of other food items being donated.	Food to be donated is frozen and collected by the charity partner at the end of the week. Chicken wings cannot be donated due to its state after being in the warmer for 4 hours Waste is tracked but not by food preparation stage, just what items are wasted.	Unsold chicken: whole, half, smaller pieces (wings, tenders)	Some stores do not have access to composting. Some stores do not donate surplus food. Staff may sometimes forget to prepare food for donation, leading to waste There are limits to what can be donated. Chicken only. Some stores say they only donate ½ and whole chickens due to space issues and quality control.	Streamline waste operations so all stores have compost bins for inedible waste Support all stores to donate food Can the donation program be expanded beyond half and whole chickens?

† Note: Each store refers to a corporate issued “shelf-life guide” that provides details for each food category and specific item-type served by the store. The shelf life is determined by whether the food item is in storage as a raw / un-prepared ingredient or the food item has already been cooked / prepared. The food items are also classified by temperature — frozen, chilled, ambient, hot — which determines how it is handled and its shelf life. The shelf life can range from 2 to 48 hours. Cooler foods (frozen or chilled) generally have a longer shelf life than warmer foods (ambient or hot) due to food safety concerns

Reducing food waste

Strategies to reduce food waste that the staff say they have used

	Site A	Site B	Site C	Site D	Overall strategies for reducing food waste
(1) Stock ordering	The ordering software and production dashboard is MacromatiX. Common sense when interpreting the amount of stock the system predicts the store should order. The manager perceives that the system over-predicts. The store aims to minimise food waste by maintaining appropriate stock levels Limited by storage space.	Common sense when interpreting the amount of stock the MacromatiX system predicts that the store should order	Common sense when interpreting the amount of stock the MacromatiX system predicts that the store should order. The manager perceives that the system over-predicts	Common sense when interpreting the amount of stock the MacromatiX system predicts that the store should order. Unlike the other stores, the manager perceives that the system slightly underpredicts. So it there is food waste, it is due to protocols not being followed. This is the head office store.	Common sense when interpreting the amount of stock the MacromatiX system predicts that the store should order.
(2) Stock delivery	The store follows a process for handling food from delivery to customer service, including temperature checks and rotation of stock.	The store follows a process for handling food from delivery to customer service, including temperature checks and rotation of stock.	Changed suppliers when the quality of vegetables delivered was consistently poor quality. The staff used to prepare (cut) many types of veg. for service many now arrive pre-cut and pre-packed. The effect on waste was not mentioned.	Signs on the cool room doors to remind delivery people and staff to close the door. Directive for staff to follow protocol.	Ensure the supplier delivers quality food products. Ensuring proper cold chain practices.
(3) Storage and rotation	First-in-first out is part of the workflow. This can reduce food waste, but this is not why the staff do it. Stock rotation is part of company policy.	First-in-first out is part of the workflow. This can reduce food waste, but this is not why the staff do it. Stock rotation is part of company policy. The type of ingredients the store uses is not something decided by the staff. However, the staff appreciate that there are frozen precut vegetables as they perceive this minimises waste.	First-in-first out is part of the workflow. This can reduce food waste, but this is not why the staff do it. Stock rotation is part of company policy. Staff report keeping food in packaging aids in reducing food waste helps with organisation.	First-in-first out is part of the workflow. Stock rotation part of company policy. Directive for staff to follow protocol. Manufacturer issued date labels help with stock rotation. Higher management also provides labels for staff to manually write: date stock received; packets were opened, food was prepared. About-to-expire chicken is cooked and given to staff and local businesses. It is still considered as waste in the financial reporting.	Stock rotation “first in first out. Date labels and packaging helps. Consider cooking and donating food / chicken that is about to expire.
(4) Food pre-preparation	Higher management direct the staff to follow the MacromatiX system predictions	Directive for staff to follow the MacromatiX AI predictive system for how much food to prepare. Cook fries to order Ensuring that the food is kept at the proper temperature.	Common sense when interpreting the amount food MacromatiX system predicts that the store should prepare in advance	Directive for staff to follow the MacromatiX AI predictive system for preparation qty. Try to only pre-cook as much hot food (chicken) that will sell in a 4-hour period (to avoid time x temp waste). Try to only pre-cook as many fries that will sell in 10min. Ensuring that the food is kept at the proper temperature.	Try to not overcook. This means common sense when interpreting the amount food MacromatiX system predicts that the store should prepare in advance Fries should ideally be cooked to order.
(5) Preparing customer orders	Not mentioned	Try to not drop food. Ensure that the right order is delivered to dine-in customers. The store implemented a tech system which assigns	Not mentioned	Directive for staff to follow protocol when preparing orders, to minimise errors. Try to not drop food.	Staff to follow protocol when preparing orders, to minimise errors, etc. More communication: between food apps

	Site A	Site B	Site C	Site D	Overall strategies for reducing food waste
		each order to a zone. This increases the speed staff identify/ deliver the correct order from the pass.		Cancelled ordered from food delivery apps given to staff to eat, so not technically wasted, but represents money loss so logged in system as wasted.	and restaurant, esp. if an order is cancelled. Empower staff to donate cancelled orders.
(6) End of shift	Not mentioned. (Assistant manager wants to donate food but is not empowered to)	Donating chicken tenders, half and whole chickens to a partner charity.	Donating half and whole chickens to a partner charity. Other food not donated (or not mentioned)	Donating chicken tenders, half and whole chickens to a partner charity.	Empower staff to donate surplus food to a partner charity.

Assessing food waste reduction strategies from the literature review

	Site A	Site B	Site C	Site D	Comments
Forecasting software for stock ordering	In action via MacromatiX software. Accuracy is not always reliable so common sense / experience is used in conjunction. System can over-predict	In action via MacromatiX software. Accuracy is not always reliable so common sense / experience is used in conjunction. System can over-predict	In action via MacromatiX software. Accuracy is not always reliable so common sense / experience is used in conjunction. System can over-predict	In action via MacromatiX software. Accuracy is not always reliable so common sense / experience is used in conjunction. System can over-predict	• MacromatiX software is used across all the stores in this QSR business. Its capabilities range from predicting customer levels to help with stock ordering, pre-preparation of food for service, and waste tracking. • The majority of the store managers perceive that the accuracy of the forecasting cannot be blindly relied upon, requiring comment sense and experience.
Forecasting software for food preparation	In action via MacromatiX software. Accuracy not always reliable and has resulted over-preparation given that staff are directed by higher management to follow it.	In action via MacromatiX software. The manager perceived that forecasts are accurate. Perceived that staff error in following this forecast is to blame for over-preparation.	In action via MacromatiX software. Accuracy is not always reliable so common sense / experience is used in conjunction. System can over-predict	Accuracy is tenable so common sense / experience is used in conjunction. System can under-predict	• MacromatiX software is used across all the stores. Majority of interviewed store managers perceived that the forecasting cannot be blindly relied upon, requiring comment sense and experience. • Opposing view that staff error in following the forecast is to blame for over-preparation
Waste tracking	In action via MacromatiX software.	In action via MacromatiX software.	In action via MacromatiX software.	In action via MacromatiX software. Waste log does not always match what is sold. Donations logged as waste.	• MacromatiX software functions include waste tracking. The majority of the interviewed store managers are positive about waste tracking but there are limitations.
Staff training specific to food waste	Assistant manager received no proper training on reducing food waste other than required back-of-house processes and the MacromatiX system.	Assistant manager received no proper training on reducing food waste other than required back-of-house processes and store workflow	Assistant manager received no proper training on reducing food waste other than required back-of-house processes and store workflow	Assistant manager received no proper training on reducing food waste other than required back-of-house processes and store workflow	• Training to staff with required knowledge of back-of-house processes and store workflow can reduce food waste, • However there is a lack of training specifically focussed on reducing food waste. Could there be an opportunity to develop a food waste module?
Food donation	Food is no longer donated. Assistant manager unsure how the store can participate in the donation program again.	A sizable amount of surplus cooked chicken is generated each day, diverted from waste through the company donation program.	There is a chicken donation program to charity. Only 1/2 and whole chickens donated due to limited space and concerns about the quality smaller pieces.	Assistant manager is empowered to donate — leads the chicken donation at his store and at an additional 8 stores. There are limits to what can be donated.	• All of the interviewed managers want to donate food, but one store is no longer donating. For the stores that do donate, there are limitations from a health/safety aspect, quality aspect, and storage space aspect. Only cooked chicken is donated.
Key:	Red — not currently or rarely used Yellow — currently used but the perception by staff is that there is room for improvement Green — currently used and the perception by management is that it works well				

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