

'Safe Recipe Style Guide' and the Evaluation of UK Meal-Kit Recipe Cards

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Introduction

Meal-kits are boxes of fresh, measured ingredients, requiring storage, preparation, and cooking by the consumer (see Figure 1). Growing in popularity, meal-kits tend to promote a healthier, less wasteful and more convenient alternative. Consumers prepare their chosen meal in their home kitchen following the step-by-step recipe card included with the ingredients provided¹⁻³.

Given the association of the domestic kitchen with the sporadic incidence of foodborne illness⁴, this current consumer trend presents unique food safety challenges, offering distinctive opportunities to inform and enable consumers to implement important food safety practices to reduce the risk of foodborne illness associated with food prepared in the home.

Research suggests that the inclusion of food safety information in recipes improves consumer food-safety practices⁵. However, little is currently known regarding food safety information in meal-kit recipe cards.

Consequently, there is a need to review and evaluate recipe cards provided in meal-kit subscription boxes to determine the inclusion of food safety information.

Purpose

The purpose of this study was to obtain examples of recipe cards from UK-based meal-kit providers and to review the recipe cards to determine the inclusion of food safety information.

Methods

- Members of the public, from the UK, were invited via social media platforms to share images of meal-kit recipe cards from the last 12 months via email and picture messaging.
- An online database was developed using a framework from the Partnership for Food Safety Education (PFSE) 'Safe Recipe Style Guide' to enable a content analysis of recipe cards according to the four predefined categories, 'Temperature', 'Cross-Contamination', 'Produce' and 'Hand Washing'⁶.
- A pilot study was performed using recipe cards ($n=18$) to assess the reliability and validity of the electronic database tool for data collection. Post-pilot amendments were made to the database tool to capture information related to chilled storage 'refrigeration' and to exclude vegetarian, vegan and ready-to-heat (RTH) recipes.
- Ethical approval was obtained from the Healthcare and Food Ethics Committee at Cardiff Metropolitan University (Reference Number PGR-5421).



Figure 1. Example of meal-kit recipe box contents and recipe card

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Results

Citizen Science methods were used to obtain meal-kit recipe cards from members of UK consumers. Images and physical copies of recipe cards ($n=689$) from ten meal-kit providers were obtained. Excluded from the final analysis were RTH, vegetarian, and vegan recipes ($n=221$), duplicates ($n=64$), older formats ($n=5$) and illegible cards ($n=26$). Overall, content analysis was performed on 359 UK meal-kit provider recipes.

'Safe Recipe Style Guide' and examples of food safety information in reviewed recipe cards



The Partnership for Food Safety Education (PFSE) produced a 'Safe Recipe Style Guide' with food safety experts and recipe writers to improve the incorporation of food safety communication in recipes with practices highlighted relating to temperature, handwashing, cross-contamination and produce^{6,7} (see Figure 2.) Recommended food safety practices aid in reducing the risk of foodborne illness by helping to eliminate the spread, slow the growth, and avoid consumption of harmful bacteria⁸⁻¹⁰.

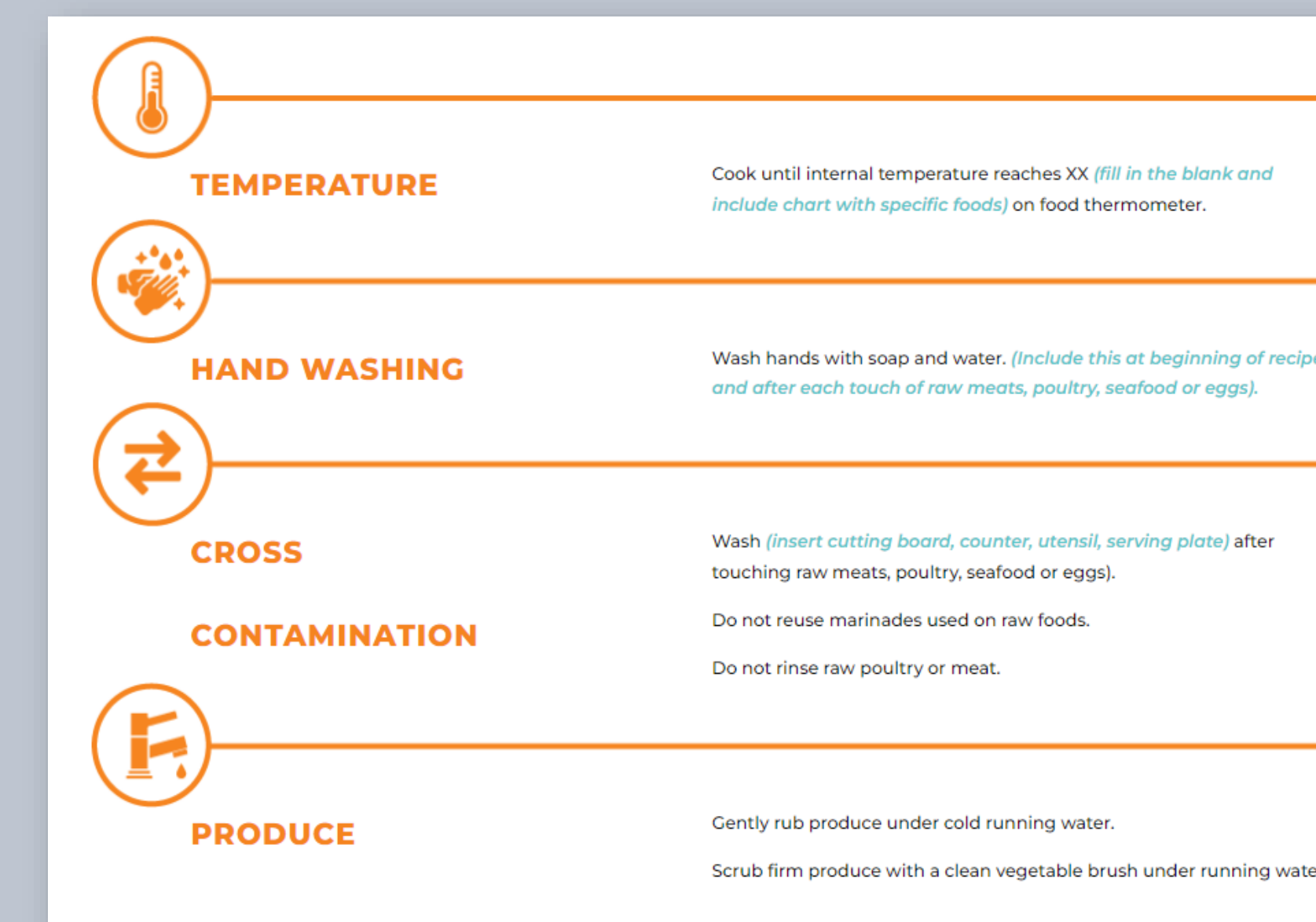


Figure 2. The 'Safe Recipe Style Guide' can be used by cookbook writers or others to incorporate food safety messages into recipes either in cookbooks, blogs, magazines or newspaper recipes⁶.

b) **IMPORTANT:** The chicken is cooked when no longer pink in the middle.

Figure 3. Subjective indicator of doneness found on recipe cards

The FSA recommend cooking burgers thoroughly to well done. Burgers served under may contain harmful bacteria that could cause food poisoning.

Figure 4. One provider gave advice on end-point temperature and expanded upon the reasons why the practice is important.

Use separate equipment to handle raw and cooked meat (or wash between uses). Missing or replaced ingredients, as well as any recipe step changes, will be communicated where possible via email.

Figure 5. Advice related to the prevention of cross-contamination

pieces to the bowl and toss to coat completely in the cornflour. **IMPORTANT:** Wash your hands after handling raw chicken.

Figure 6. Handwashing advice observed within the recipe instructions

Remember to wash your fresh fruit, herbs and vegetables! See your delivery email for use-by dates and other details.

Figure 7. Example of guidance for washing fruit, vegetables and herbs.

Storage: Keep refrigerated below 5°C.

Figure 8. Best practice example of refrigerated storage advice. Observed on only one recipe card.

Potatoes**	2P
Red Onion**	1
Closed Cup Mushrooms**	150g
Carrot**	2
Garlic Clove**	2
Panko Breadcrumbs	25g
13)	
Olive Oil for the Crumb*	2 tbsp
Diced Chicken Breast**	280g
Water for the Sauce*	100ml
Chicken Stock Paste	10g
Crema Fraiche** 7)	150g
Bacon Lardons**	90g
*Not Included **Store in the Fridge	

Figure 9. The more commonly observed refrigeration advice related to storing in the refrigerator but without recommended temperatures stated.

Temperature

- Statements on the recipe cards regarding the cooking adequacy of high-risk foods ($n=1306$) included subjective cooking indicators with 35% relating to the visual assessment of colour (see Figure 3) and 26% referring to cooking duration.
- There was one best practice statement for using a meat thermometer to determine cooking adequacy.
- There were two recommendations for cooking to an internal temperature of 75°C. The provider subsequently expanded 'why' this practice is important (see Figure 4).

Cross-Contamination

- When applicable ($n=346$), cross-contamination prevention advice was present in 51% of recipes.
- The most frequently included advice (47%) was 'wash equipment in-between uses' (see Figure 5).
- There was no advice to reduce the risk of cross-contamination after handling ingredients such as raw meat and poultry in 49% of recipe cards.
- Advice relating to 'not washing meat' was included in 36% of recipe cards, with this advice being found in a separate section adjacent to the recipe instructions. However, there was no further advice on 'why' this practice is important.

Handwashing

- Although 46% of recipes referred to handwashing at the start of recipe preparation, these stated 'wash hands' with no further advice regarding hand hygiene such as the use of soap or drying.
- 48% of recipe cards did not refer to handwashing during recipe preparation.
- When statements regarding handwashing were included ($n=167$), the information was located within the recipes' cooking instructions (65%) and/or in a section adjacent to the recipe (97%).
- When the handwashing statement was located within the recipe instructions ($n=104$), it was highlighted with an 'important' disclaimer with different text formatting distinguishing it from the rest of the recipe instructions (see Figure 6).

Produce

- Fruit, vegetables, and herbs were included in nearly all the recipe cards (99%).
- Most recipes (88%) referred to washing fruit and vegetables but were not observed as frequently for herbs (51%) (see Figure 7).
- The consumption of a raw element such as a salad, herb or produce garnish was observed in 248 recipes, of which 11% made no reference to washing produce.

Refrigeration

- Of the applicable recipes ($n=332$), 50% referred to storing ingredients in the fridge, but only one recipe (0.3%) referred to recommended temperatures ($\leq 5^{\circ}\text{C}$) (see Figure 8).
- Most of the refrigeration storage advice (47%) was found on the back of the recipe card, adjacent to the recipe instructions (see Figure 9).

Significance of study

- Although all meal-kit providers provided some form of food safety related information in reviewed recipes, the information was often not deemed sufficient to enable consumers to ensure food safety in the domestic setting.
- There is a need to understand how consumers engage with such information with further exploration required through observational research to understand optimum positioning and messaging.