

本期內容 IN THIS ISSUE

- ❖ 對未煮熟的肉過敏？了解食物過敏、食物不耐受與食物中毒
- ❖ 巴士德消毒與食物安全
- ❖ 炒飯中的蠟樣芽孢桿菌
- ❖ 正確貯存 — 減少煮熟蔬菜中亞硝酸鹽含量增加的要訣
- ❖ 風險傳達工作一覽
- ❖ Allergy to Undercooked Meat? A Look into Food Allergy, Food Intolerance and Food Poisoning
- ❖ Pasteurisation and Food Safety
- ❖ *Bacillus cereus* in Fried Rice
- ❖ Proper Storage - Key to Minimising Nitrite Level Increase in Cooked Vegetables
- ❖ Summary of Risk Communication Work

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對未煮熟的肉過敏？

了解食物過敏，食物不耐受與食物中毒

Allergy to Undercooked Meat? A Look into Food Allergy, Food Intolerance and Food Poisoning

食物安全中心風險傳達組
科學主任陳蓉蓉女士報告

Reported by Ms. Melva CHEN, Scientific Officer,
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食物安全中心進行了一項研究，評估食物處理人員對烹製漢堡牛肉的知識、態度及做法，並編製了《安全烹製牛肉漢堡業界指引》。一些受訪的食物處理人員認為，有顧客在吃了他們所烹製未煮熟的漢堡肉餅後感到不適，可能是基於「過敏反應」，而不是食源性疾病，即通常所稱的食物中毒。有些處理人員則認為，以昂貴的牛肉(例如和牛)製成的漢堡肉餅可以生吃，或只需略為煮熟。本文將破解這些迷思，並說明為何尤其必須把碎肉徹底煮熟，才可殺死可能導致食物中毒的微生物。

The Centre for Food Safety undertook a study to evaluate food handlers' knowledge, attitudes and behaviours regarding the preparation of beef burgers and taking into account the study findings, issued the [Trade Guidelines on Safe Preparation of Beef Burgers](#). During interviews with food handlers, some who served undercooked patties thought that sick customers might have an 'allergic reaction' after eating their burgers rather than a foodborne disease, often known as food poisoning. Some handlers believed that burger patties made from expensive beef, like wagyu, could be eaten raw or lightly cooked. This article dispels such myths and emphasises the need of thorough cooking to kill microorganisms, especially in mince, that might cause food poisoning.

病症 Condition	出現症狀的時間 Onset of symptoms	原因 Cause(s)
 食物過敏 Food allergy	快；分量很少已可引致過敏 Fast; trace amounts cannot be tolerated	人體免疫系統把特定食物（致敏物）誤以為危險而引發免疫反應 Immune response triggered by body's immune system mistakenly identifying specific food (allergen) as a danger
 食物不耐受 Food intolerance	慢；可延至進食數小時後 Slow; can be delayed by hours after ingestion	通常是某些營養素的消化問題，例如乳糖不耐症患者無法消化奶類中的乳糖 Usually a digestive problem with certain nutrients, e.g. people with lactose intolerance cannot digest lactose in milk
 食物中毒 Food poisoning	由數分鐘至數天不等，視乎病原體而定 Varies, depending on the causative agents, from minutes to days	• 生物媒介：細菌(例如沙門氏菌、致病性大腸桿菌)、病毒(例如諾如病毒)、寄生蟲(例如隱孢子蟲)、細菌產生的毒素 Biological agents: bacteria (e.g. <i>Salmonella</i> , pathogenic <i>E. coli</i>), viruses (e.g. norovirus), parasites (e.g. <i>cryptosporidium</i>), toxins produced by bacteria • 化學媒介：例如野生菇類及河豚中的天然毒素 Chemical agents: e.g. natural toxins in wild mushrooms and puffer fish

圖1：食物過敏、食物不耐受與食物中毒的分別

Figure 1: Differences between food allergy, food intolerance and food poisoning

食物過敏與食物不耐受

食物過敏是一種異常的免疫系統反應，在進食某些食物後迅速發生。免疫系統通常保護人體免受病原體侵害，但在食物過敏的情況下，免疫系統會把某種食物誤以為是危險的。即使攝入的致敏物分量很少，也可能會在進食後數分鐘至一小時內出現不適的症狀，例如嘔吐、胃部不適、蕁麻疹或呼吸道腫脹。過敏性休克是一種嚴重的免疫反應，會使人陷入休克狀態。常見的食物致敏物包括奶類、蛋類、花生、木本堅果、大豆、小麥、海產及介貝類。雖然避免食物致敏物是避免過敏反應的首要方法，但掌握正確的資訊，例如致敏物標籤，有助作出安全的食物選擇。

食物不耐受是一種不太嚴重的病症，出現問題的通常僅限於消化系統，而不是免疫系統。舉例來說，乳糖不耐症是因缺乏分解乳糖所需的乳糖酶而造成的消化不良。乳糖不耐症患者無法消化乳糖，但腸道中的細菌會把乳糖分解，導致腹脹、胃部不適及腹瀉。食物不耐受患者可能可以食用少量致敏食物而不會出現問題。他們只要注意飲食，便可避免不適的反應，例如乳糖不耐症患者可能適合飲用無乳糖的奶類或[植物製牛奶替代品](#)。

食物中毒

雖然並非所有人都有食物過敏或不耐受，但如果食用受細菌、病毒、寄生蟲或化學品污染的食物，人人都有食物中毒的風險(圖1)。在生產食物的任何階段，有害細菌或其毒素都可以污染食物，特別是如果食物處理或烹煮不當。食物中毒的常見症狀包括腹痛、腹瀉、噁心及嘔吐，症狀可持續數小時至數天，視乎病原體而定。長者、嬰幼兒、孕婦及免疫力弱人士等高危人士，可能會出現嚴重的後遺症，甚至危及生命的情況。細菌是造成本港食物中毒個案的最常見原因。二零二一年，本地食肆食物中毒個案[最常見的三大成因](#)分別是熟食被生的食物污染、食用生的食物，以及食物未經徹底煮熟。為了有效減低微生物的威脅，肉類、家禽、魚類及蛋類要煮至內部溫度至少達攝氏75度，以確保可供安全食用。

為何漢堡肉餅不應生吃或只是略為煮熟？

在屠宰及處理的過程中，肉的表面可能會被沙門氏菌及致病性大腸桿菌等有害細菌污染。如果牛扒是原塊切成的牛肉，其內部通常不含細菌，略煎牛扒表面，便可以殺死表面上的細菌。然而，當肉絞碎製成漢堡肉餅時，生肉表面的有害細菌會散布至整塊肉餅。除非把漢堡肉餅徹底煮熟，否則這些細菌仍可在肉餅中存活。由於引致食物中毒的微生物普遍存在於食物鏈中，所有漢堡肉餅都可能含有這些微生物，包括以優質或昂貴的肉製成的漢堡肉餅。

食物安全至上

食物處理人員如把食物中毒誤以為是食物過敏，便有可能忽略食物安全措施，因為他們未有注意到顧客在吃了未煮熟的漢堡肉後出現不適的情況，是由於細菌污染所致。食物處理人員必須了解食物中毒的原因，並實踐食物安全來預防食物中毒。在處理食物時，應遵循簡單而有效的「[食物安全五要點](#)」，以預防食源性疾病：精明選擇(選擇安全的原材料)；保持清潔(保持雙手及用具清潔)；生熟分開(分開生熟食物)；煮熟食物(徹底煮熟食物)；以及安全溫度(把食物存放於安全溫度)。

Food Allergy and Food Intolerance

Food allergy is an unusual immune system reaction that occurs rapidly after eating certain foods. The immune system normally defends the person from pathogens, but in the case of food allergies, it misinterprets the food as dangerous. Even minimal allergen exposure might result in unpleasant symptoms such as vomiting, stomach discomfort, hives or swollen airways within minutes to an hour after eating. Anaphylaxis is a severe immunological reaction that sends a person into shock. Common food allergens include milk, eggs, peanuts, tree nuts, soy, wheat, seafood and shellfish. While avoiding the food allergen is the primary way to avoid a reaction, having the correct information, such as allergen labelling, helps making safe food choices.

Food intolerance is a less serious condition; instead of the immune system, it is typically limited to digestive problems. Lactose (milk sugar) intolerance, for instance, is a digestive disorder caused by the deficiency of lactase, an enzyme that digests lactose. While a person with lactose intolerance is unable to digest lactose, the bacteria in the gut consume it, causing bloating, stomach discomfort and diarrhoea. People with food intolerance may be able to have trace quantities of the offending food without a problem. They may avoid unpleasant responses by watching out for what they eat. Lactose-free milk or [plant-based milk alternatives](#), for example, may be appropriate for a lactose intolerant person.

Food Poisoning

While not all people have food allergies or intolerances, they are at risk of having food poisoning if they consume food contaminated with bacteria, viruses, parasites or chemicals (Figure 1). Harmful bacteria or their toxins can contaminate food at any stage of production, particularly if food is handled or cooked improperly. Common symptoms of food poisoning include abdominal pain, diarrhoea, nausea and vomiting, which can last from hours to days depending on the causative agent. Individuals who are vulnerable, such as the elderly, babies and young children, pregnant women and anyone with weakened immunity, may have severe sequelae and life-threatening conditions. Bacteria are the most common cause of food poisoning in Hong Kong. In 2021, the [three most prevalent contributing factors](#) to food poisoning in local food premises were contamination of cooked food by raw food, consumption of raw food and inadequate cooking. To effectively reduce microbiological threats, cook meat, poultry, fish and eggs to an internal temperature of at least 75°C to help guarantee that they are safe for eating.

Why Burger Patties Should Not be Eaten Raw or Lightly Cooked?

The surface of meat can be contaminated by harmful bacteria such as *Salmonella* and pathogenic *E. coli*. during slaughtering and handling. For a steak which is an intact cut of beef, the inside usually does not contain bacteria. Searing the outside surface of the steak can kill the surface bacteria. However, when meat is minced to produce burger patties, any harmful bacteria present on the surface of the raw meat will be spread throughout the patty. Unless the burger patty is cooked right through, these bacteria can remain alive on the inside. Since food poisoning organisms are prevalent throughout the food chain, this happens to all burger patties, including those made from good quality or expensive meat.

Food Safety First

Food handlers who mistake food poisoning for food allergy may overlook food safety practices because they are not aware that the adverse conditions of their customers upon eating undercooked burgers are due to bacteria contamination. It is important for food handlers to know the cause of food poisoning and prevent it by practising food safety. The "[5 Keys to Food Safety](#)" are five simple and effective practices for people to follow when handling food to prevent foodborne diseases: Choose (choose safe raw materials); Clean (keep hands and utensils clean); Separate (separate raw and cooked food); Cook (cook thoroughly); and Safe Temperature (keep food at safe temperature).

巴士德消毒與食物安全

Pasteurisation and Food Safety

食物安全中心風險傳達組
科學主任葉景新先生報告

Reported by Mr. Kenneth YIP, Scientific Officer,
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何謂巴士德消毒？

巴士德消毒是罐頭及冷藏以外常見的食物防腐技術，用以保存容易腐壞的食物，例如奶類、蛋類及果汁。這是一種熱處理方法，目的是把致病微生物的數量減少至不會對健康構成嚴重危害的水平。巴士德消毒有助保持食品的理想質感，例如意大利芝士蛋糕及炒滑蛋。

巴士德消毒把食物加熱至特定溫度並保持一段時間，以科學家路易巴士德的名字命名，他在一八六零年代證明葡萄酒及啤酒經加熱幾分鐘後可防止變壞。巴士德消毒透過殺滅不能產生孢子的致病細菌及令食物腐壞的微生物的繁殖細胞，以及抑制酶的活性，來延長食物的保質期。

巴士德消毒可以採用不同的時間與溫度組合來進行。舉例來說，進行巴士德消毒的生乳可以攝氏63度加熱30分鐘，或以更高的溫度攝氏72度加熱15秒，然後立即冷卻至不超過攝氏10度的溫度。巴士德消毒系統的研發是使用最耐熱的病原體伯納特立克次體為指標，以減少99.999%的微生物數量。施加的溫度越高，所需的熱處理時間便越短。巴士德消毒所用的時間與溫度組合，是為殺死有害細菌而設計，例如李斯特菌、沙門氏菌、彎曲菌，以及牛型分枝桿菌（這是在商業奶類生產廣泛採用巴士德消毒前，患者感染結核病的常見原因）。然而，巴士德消毒有其局限性。一些產生孢子的細菌，例如芽孢桿菌，在進行巴士德消毒後可能仍保持活性，如果在不適當的條件下貯存經巴士德消毒的食物，有可能導致食物變壞，甚至食物中毒。

由於巴士德消毒涉及熱處理，有人或會擔心，加熱過程會導致營養素流失。巴士德消毒對各種營養素的影響各有不同。以奶類為例，進行巴士德消毒對礦物質、脂肪成分及蛋白質的影響很小，也不會影響維他命B1及B6等某些維他命，但會減少不耐熱維他命的含量，例如維他命C。

使用經巴士德消毒的配料製作無需徹底煮熟的菜式較為安全

雖然要消滅食源性病原體必須把食物徹底煮熟，但某些菜式需要以較低的溫度加熱來處理食品。與生的及未經處理的同類食物相比，經巴士德消毒的食物是較安全的選擇，這是因為巴士德消毒可以減少食物中的微生物數量，但同時保持食物的質感。

經巴士德消毒的蛋製品，例如經巴士德消毒的有殼蛋、蛋白粉及蛋漿，可用於烹製需要以非全熟的蛋製作的菜式。

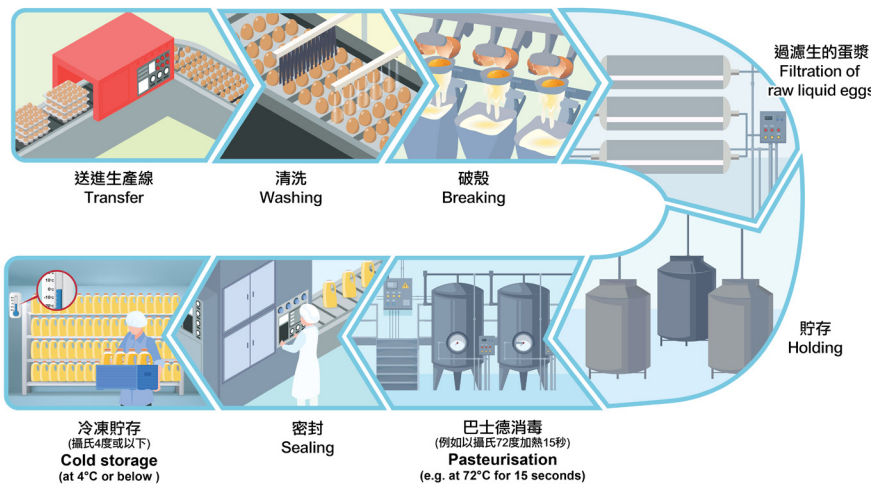


圖3：經巴士德消毒的蛋漿的生產流程
Figure 3: Production flow of pasteurised liquid eggs

What is Pasteurisation?

Pasteurisation, along with [canning](#) and [freezing](#), is a common technique of food preservation for perishable foods such as milk, eggs and juices. It is a heat treatment process that aims at reducing the number of pathogenic micro organisms to a level at which they do not constitute a significant health hazard. Pasteurisation helps maintain the desirable texture of food products, such as [tiramisu](#) and [soft-scrambled eggs](#). This article will elaborate pasteurisation with examples of pasteurised food products, and suggest ways of handling pasteurised foods safely.

Pasteurisation involves heating food to a specific temperature for a set period of time. It is named after scientist Louis Pasteur, who proved in the 1860s that heating wine and beer for a few minutes would prevent spoilage. Pasteurisation aims at extending the shelf-life of food by inactivating non-spore-forming pathogenic bacteria and vegetative cells of spoilage microorganisms, as well as inhibiting enzyme activity.

Various processing time and temperature combinations can be applied for pasteurisation. Raw milk, for example, can be pasteurised by heating at 63°C for 30 minutes, or at a higher temperature of 72°C for 15 seconds, and then immediately cooling it to a temperature of not more than 10°C. Pasteurisation systems are developed to achieve a 99.999% reduction of the microbial load by using the most heat-tolerant target pathogen *Coxiella burnetii*. The higher temperature is applied, the shorter the heat treatment time is required. The pasteurisation time and temperature combinations used are designed for killing harmful bacteria such as *Listeria*, *Salmonella*, *Campylobacter* and *Mycobacterium bovis*, a common cause of tuberculosis before the widespread application of pasteurisation in commercial milk production. However, pasteurisation has its limitations. Some spore-forming bacteria like *Bacillus* may remain active after pasteurisation, which could lead to food spoilage or even food poisoning if the pasteurised food is stored under improper conditions.

As pasteurisation involves heat treatment, some may be concerned that such process would cause nutrient loss. Pasteurisation has different effects on various nutrients. Pasteurisation of milk, for example, is found to have little impact on minerals, fat composition and proteins. While pasteurisation has no impact on certain vitamins such as vitamin B1 and B6, it diminishes the amounts of those less heat-stable like vitamin C.

Pasteurised Ingredients are Safer for Dishes Without Thoroughly Cooked

While cooking food thoroughly is essential to eradicate foodborne pathogens, certain recipes may need food items to be treated with lower heat. When compared to their raw and untreated equivalents, pasteurised foods could be a safer option. It is because pasteurisation can reduce the amount of microorganisms in the food while maintaining its texture.

Pasteurised shell eggs, dried egg white powders and liquid eggs are examples of pasteurised egg products that may be used to prepare dishes that need to be made with lightly cooked eggs.



圖2：市面上常見的經巴士德消毒的食品
Figure 2: Pasteurised food products commonly available on the market

正確處理經巴士德消毒的食物以確保食物安全

由於巴士德消毒並非殺死所有細菌，也不能消滅可發芽並導致食物變壞或食物中毒的孢子，因此正確貯存經巴士德消毒的食物是很重要的。食品雜貨店通常把經巴士德消毒的食物存放在雪櫃裡，原因就在於此。為了防止細菌生長，應按照製造商的指示貯存經巴士德消毒的食物，例如經巴士德消毒的奶類、豆漿、果汁及蛋製品要冷存於攝氏4度或以下。使用經巴士德消毒的產品前應先查看食用期限，並在開封後盡快使用。

Proper Handling of Pasteurised Food to Secure Food Safety

As pasteurisation does not kill all bacteria and cannot destroy spores that may germinate and cause food spoilage or food poisoning, proper storage of pasteurised foods is important. This is why pasteurised foods are typically kept in the fridges of grocery stores. To prevent bacterial growth, it is critical to follow the manufacturer's instructions to store pasteurised foods, such as keeping pasteurised milk, soybean milk, juices and egg products refrigerated at or below 4°C. Check the expiry dates of pasteurised products before use. Once opened, use the pasteurised products as soon as possible.

炒飯中的蠟樣芽孢桿菌 *Bacillus cereus* in Fried Rice

最近，食物安全中心（食安中心）從一食肆抽取了一個炒飯樣本，檢出所含的蠟樣芽孢桿菌數量屬不滿意。食安中心調查後發現，食肆把煮熟的飯長時間放置於環境溫度下，懷疑是導致微生物檢測結果不滿意的原因。

蠟樣芽孢桿菌是一種無處不在的細菌，可在土壤、環境中找到，也少量存在於生的、乾製及加工食品中，可以產生耐熱的毒素及孢子。烹煮能殺死蠟樣芽孢桿菌的繁殖細胞，但其孢子仍可存活，當食物長時間放置於室溫下，孢子便會發芽並產生毒素。蠟樣芽孢桿菌食物中毒最常涉及的是烹煮後置於室溫下過久的食物，例如煮熟的飯，亦曾有食物中毒個案涉及新鮮製成的豆漿，以及炆肉、咖喱及盆菜等砂鍋類菜式。因此，為了預防蠟樣芽孢桿菌食物中毒，並非即時食用的食物應存放於安全溫度，即攝氏60度以上，或攝氏4度或以下。如需冷卻煮熟的食物，應盡快進行，例如在兩小時內降溫至攝氏20度，並在隨後四小時內由攝氏20度降溫至攝氏4度。

Recently, the Centre for Food Safety (CFS) collected a sample of fried rice from a restaurant containing an unsatisfactory level of *Bacillus cereus* (*B. cereus*). Investigation by the CFS revealed that the cooked rice was left at ambient temperature for a prolonged period and this was suspected to be the reason for the unsatisfactory microbiological result.

B. cereus is a ubiquitous bacterium that can be found in soil, environment, and at low levels in raw, dried and processed food. It can form both heat-stable toxins and spores. Cooking kills the vegetative cells of *B. cereus*, but their spores can survive and subsequently germinate and produce toxins when the food is kept at room temperature for an extended period. *B. cereus* food poisoning is most commonly associated with food, such as cooked rice left at room temperature for too long after cooking. Food poisoning with freshly prepared soybean milk, and casseroles such as meat stew, curry and Poon Choi have also been reported. Therefore, to prevent *B. cereus* food poisoning, food not consumed immediately should be kept at safe temperatures, i.e. above 60°C or at or below 4°C. When cooling, cool cooked food as quickly as possible, for example to 20°C within two hours and from 20°C to 4°C within the next four hours.

正確貯存 — 減少煮熟蔬菜中亞硝酸鹽含量增加的要訣 Proper Storage – Key to Minimising Nitrite Level Increase in Cooked Vegetables

蔬菜是健康飲食的重要一環，但有人由於擔心煮熟的蔬菜在存放一夜後可能會含有大量亞硝酸鹽，有害健康，因此不會把隔夜熟菜帶回工作間作午餐。為此，食物安全中心就煮熟蔬菜中的亞硝酸鹽含量進行了風險評估研究。

研究顯示，所有蔬菜樣本在烹煮前後均沒有檢測到亞硝酸鹽。在冷凍溫度下（攝氏0至4度）存放一夜後，所有熟菜樣本都沒有檢測到亞硝酸鹽。然而，在室溫下存放12小時後，有些樣本的亞硝酸鹽含量開始上升。研究結果發現，存放溫度對煮熟蔬菜中的亞硝酸鹽含量有重要的影響。

市民宜正確貯存煮熟的蔬菜，以延遲亞硝酸鹽的形成。剩菜應在烹煮後兩小時內放進雪櫃貯存，並盡快食用。在到達工作間後，應立即把在家自備的餐盒或午餐飯盒存放在雪櫃中。在食用前，應把食物徹底翻熱至中心溫度達攝氏75度。保持多元化的飲食，包括進食各種蔬菜，對促進健康至為重要。

Vegetables are an important part of a healthy diet. However, some people prefer not to take cooked vegetables left out overnight to work for lunch because of the concern that they might contain high levels of nitrite which could be bad for health. To this end, the Centre for Food Safety conducted a risk assessment study on the nitrite levels in cooked vegetables.

The study found no nitrite in any of the vegetable samples before or shortly after cooking. When stored at refrigerated temperature (0 to 4°C) overnight, nitrite was not detected in all cooked vegetable samples. However, when stored at room temperature, the nitrite levels started to increase in some samples after storing for 12 hours. The study results revealed that storage temperature has a significant role in the nitrite levels in cooked vegetables.

Members of the public are advised to store cooked vegetables properly to delay nitrite formation. Leftovers should be refrigerated within two hours after cooking and consumed as soon as possible. Home-packed meals or lunchboxes should be stored in a fridge immediately once arriving at the workplace. Reheat food thoroughly until its core temperature reaches 75°C before consumption. A diverse diet including a variety of vegetables is essential for better health.



風險傳達工作一覽（二零二二年六月）

Summary of Risk Communication Work (June 2022)

事故/ 食物安全個案 Incidents/ Food Safety Cases: 189	公眾查詢 Public Enquiries: 91	業界查詢 Trade Enquiries: 333	食物投訴 Food Complaints: 374	給業界的快速警報 Rapid Alerts to Trade: 4
給消費者的食物警報 Food Alerts to Consumers: 4	懷疑食物中毒個案通報 Suspected Food Poisoning Alerts: 4	教育研討會/ 演講/ 講座/ 輔導 Educational Seminars/ Lectures/ Talks/ Counselling: 43	上載到食物安全中心網頁的新訊息 New Messages Put on the CFS Website: 50	