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植物製牛奶替代品知多點

More about Plant-based Milk Alternatives

食物安全中心風險傳達組
科學主任游天頌先生報告

Reported by Mr. Arthur YAU, Scientific Officer,
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牛奶是世界各地常見的飲品，但一些消費者基於不同的考慮因素，例如健康、環境及道德上的關注，希望減少食用動物產品，包括乳製品。為了滿足這方面的需求，食物業生產了各種植物製牛奶替代品(植物奶)來代替牛奶，通常在超級市場、餐室及部分食肆有售。本文將討論植物奶的食物安全事宜。

植物製牛奶替代品的生產

植物奶的概念並不新鮮。豆奶在中國已有悠久的歷史，可以追溯到漢代，而中東最早於13世紀已有杏仁奶的記載。另一方面，由於對乳糖不耐症的認識提高及其他方面的考慮，加上味道、價格及供應上的改善，西方消費者越來越接受植物奶作為牛奶的替代品，植物奶的需求因而在近幾十年來大幅增長。

現今市面上供應的植物奶種類繁多，包括由豆類(例如大豆)、穀類(例如米、燕麥)、堅果(例如杏仁)及其他種子製成的植物奶。植物奶的加工方法大致上可分為乾濕兩種(圖1)。濕磨法把主要原材料先浸泡在水中，才進行

While cow's milk is commonly consumed worldwide, some consumers want to reduce their consumption of animal products, including dairy products out of considerations such as their own consideration for health, environment and ethics. To fulfil the demand, the food industry is producing a variety of plant-based milk alternatives (PBMA) as an alternative for cow's milk that are often available at supermarkets, cafes and some restaurants. This article will discuss the food safety issues of PBMA.

Production of Plant-based Milk Alternatives

The concept of PBMA is not new. Soya milk has a long history in China, dating back to the Han dynasty, whereas almond milk was first reported in the Middle East in the thirteenth century. On the other hand, the demand for PBMA has grown significantly in recent decades due to the increased awareness of lactose intolerance and other considerations, and the increasing acceptance by western consumers as an alternative to cow's milk due to improvements in taste, price and availability.

There is a large variety of PBMA available these days, including those made from legumes (e.g. soybean), cereals (e.g. rice, oat), nuts (e.g. almond) and other seeds. PBMA can generally be processed in two ways: wet or dry (Figure 1).

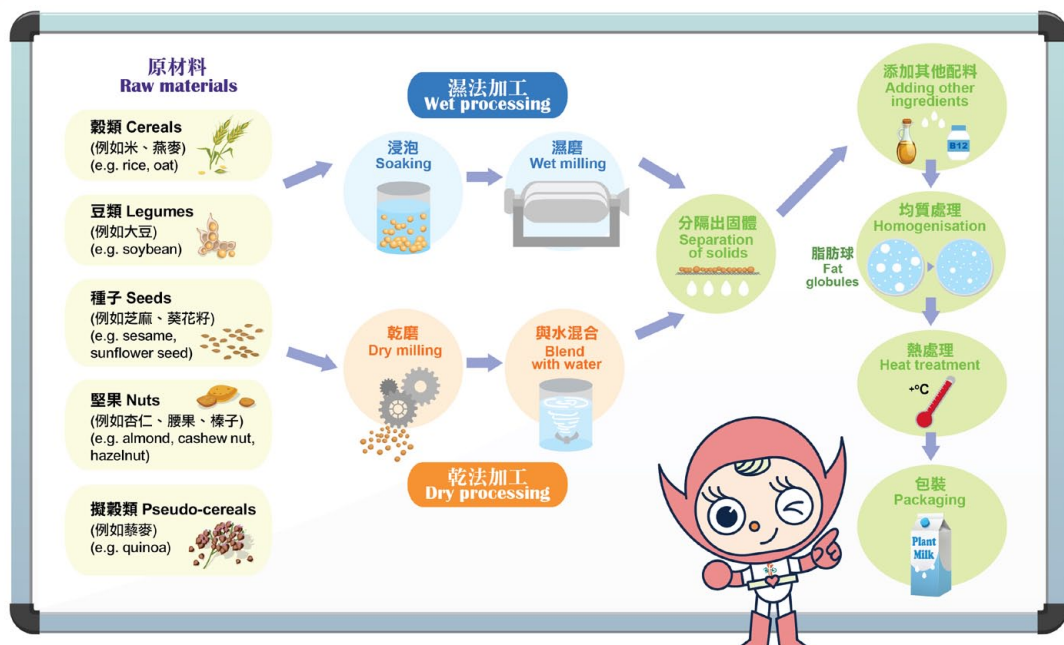


圖1：植物奶的生產

Figure 1: The production of PBMA

磨粉。有時會添加酶來分解某些成分，例如碳水化合物及蛋白質。乾法加工則把原材料先磨成粉，然後進行處理以分離出所需的配料，才以水浸泡。經乾法或濕法加工後所提取的液體會進行均質處理，以縮小脂肪球的體積，使脂肪不易分離，令產品更加穩定。最後進行熱處理，以減少變壞的機會。由於蛋白質及脂肪含量不同，植物奶的味道及口感有別於乳製品。

食物安全、營養及致敏方面的關注

植物奶與牛奶一樣，都含有豐富的營養素，有利細菌生長，損害貯存期間的品質及安全。熱處理可以延長植物奶的保質期，還可賦予理想的味道。與牛奶一樣，經巴士德消毒的植物奶必須冷存，而經消毒法處理的產品則可在環境溫度下貯存。消費者應注意，在打開包裝後，植物奶產品的保質期及貯存方法會受影響一開封後應盡快飲用或存放在雪櫃，並按照生產商的指示貯存。

與牛奶相比，植物奶的成分組合有很大差異。以未添加營養素的豆奶為例，其鈣含量是牛奶的十分之一。因此，若以植物奶代替牛奶並作為膳食中鈣質的主要來源，應細閱植物奶產品營養標籤上的鈣含量。此外，植物奶的游離糖及脂肪含量各有差異，視乎天然及添加的分量而定。植物奶通常添加了游離糖(例如來自蔗汁及楓糖漿的游離糖)及油脂，以令味道及口感更佳。如採取嚴格的全素飲食，應以添加了維他命B12的植物奶或穀類作為牛奶的替代品，因為沒有源自植物的食材可以作為安全可靠的維他命B12來源。最後，由於通常認為植物來源的蛋白質在品質上不如肉類及牛奶理想，素食者宜食用各種堅果、種子、豆類及豆製品，以達到營養均衡。值得注意的是，兒童需要充足的蛋白質及能量，才可正常生長發育。如果成長中的兒童以植物奶作為日常飲食的一部分，便需要其他食物來源的蛋白質及能量來代替牛奶提供的蛋白質及能量。

有些人可能因為乳糖不耐症或對牛奶蛋白質過敏而選擇植物奶。要注意的是，一些植物奶可能含有不存在於牛奶中的致敏物，例如大豆、穀類及堅果，可導致高危人士出現嚴重反應。在購買時，消費者應細閱食物標籤上的致敏物資料，以避免致敏的配料。

給業界的建議

- 食物生產商應確保植物奶產品的標籤準確無誤，並符合本地規例對食物營養及致敏物標籤的要求。
- 業界應按貯存指示妥善存放植物奶產品。食肆應把已開封的植物奶存放在雪櫃，並盡快使用。

給消費者的建議

- 按貯存指示存放植物奶產品，並在開封後盡快飲用。
- 注意植物奶不適合對當中所含物質過敏的人士飲用，應細閱食物標籤上的配料表及致敏物資料。
- 細閱營養標籤，比較不同乳製品/植物奶產品的營養含量，以配合個人需要(例如鈣質的來源)和作出更健康的選擇(例如較低的糖及脂肪攝取量)。
- 如果考慮以植物奶代替兒童飲食中的牛奶，應徵詢專業意見。

In wet milling, the main raw materials are soaked in water before they are milled. Enzymes are sometimes added to break down certain components like carbohydrates and proteins. In dry processing, the raw materials are first milled into powder, followed by treatments to isolate the desired ingredients before soaking with water. The liquid extracts from both processes are then homogenised to reduce the size of fat globules, making the fat less likely to separate and the product more consistent. It will then be heat treated to reduce the possibility of spoilage. Because of the differences in protein and fat content, PBMA has taste and mouthfeel distinct from dairy products.

Food Safety, Nutritional and Allergy Concerns

PBMAs, like cow's milk, are rich in nutrients which can facilitate the growth of bacteria, impairing the quality and safety during storage. Heat treatments can prolong the shelf life of PBMA products and also impart desirable taste. As with milk, pasteurised PBMA products must be refrigerated, whereas sterilised products can be stored at ambient temperature. Consumers should be aware that the durability and storage method of a PBMA product will be affected once the package is opened – consume or refrigerate as soon as possible after opening and always follow the manufacturer's storage instructions.

PBMAs are quite variable in their composition compared to cow's milk. Unfortified soya milk, for example, has one-tenth the calcium content of milk. Therefore, if using PBMA as a substitute for milk and a primary source of dietary calcium, one should read the calcium amounts on the nutrition labels of PBMA products. Furthermore, the levels of free sugars and fats in PBMA products vary, depending on the natural and added levels. Free sugars, such as those from cane juice and maple syrup, as well as fats and oils are often added to PBMA products for better taste and mouthfeel. For persons who adopt a strict vegetarian diet, PBMA products or cereals fortified with vitamin B12 should be used as a milk replacement, as no plant has been demonstrated to be a safe and dependable source of vitamin B12. Finally, since the quality of protein from plant sources is generally regarded as less optimal than that of meat and milk, vegetarians are advised to consume a variety of nuts, seeds, legumes and soy products in order to achieve balanced nutrition. Of note, children need sufficient protein and energy for normal growth and development. If PBMA products are a regular part of a growing child's diet, other food sources of protein and energy need to replace the protein and energy otherwise provided by milk.

Some people may choose PBMA products due to lactose intolerance or allergy to cow's milk protein. Notably, a number of PBMA products may contain allergens like soybeans, cereals and nuts that are not present in milk and can cause significant reactions in susceptible populations. Upon purchase, consumers should read the food allergen information on food labels to avoid undesirable ingredients.

Advice to the Trade

- Food manufacturers should ensure that the labelling for PBMA products is accurate and fulfils the local regulatory requirement on the labelling of food nutrition and allergens.
- The trade should store PBMA products properly as instructed. Catering outlets should refrigerate opened PBMA products and use them as soon as possible.

Advice to Consumers

- Follow the instructions for storing PBMA products and consume them as soon as possible once opened.
- Note that PBMA products are not suitable for anyone allergic to the substance(s) from which the beverages are derived. Always read the ingredient list and food allergen information on food labels.
- Read nutrition labels to compare the nutritional content among different dairy/PBMA products for suiting one's needs (e.g. source of calcium) and a healthier choice (e.g. lower intake of sugar and fat).
- Seek professional advice if you are considering to replace milk in your children's diet with PBMA products.

冷藏保存食物 — 如何安全地處理冷藏食物

Preserve Food by Freezing – How to Handle Frozen Food Safely

食物安全中心風險傳達組
研究主任鄭基慧女士及科學主任葉景新先生報告

Reported by Miss Amy CHENG, Research Officer, and
Mr. Kenneth YIP, Scientific Officer, Risk Communication Section, Centre for Food Safety

冷藏是罐頭以外常見的食物防腐方式。然而，與罐頭不同的是，冷藏不僅可以保持食物的品質，但亦保存了一些致病微生物的生存能力。本文會討論冷藏如何延長食物的保質期，以及消費者在處理冷藏食物時應採取的預防措施。

冷藏如何防止食物變壞？

冷藏可以延長食物的保質期，因為以攝氏零下18度貯存食物可使食物中的酶及微生物(包括細菌、酵母菌及霉菌)失去活性。在冷藏下，食物中的水分變為冰晶，令需要水分才可生長的微生物無法獲得水分供應。在冷藏溫度下，亦可消滅旋毛蟲等寄生蟲。不過，冷藏無法殺滅細菌及病毒，而諾如病毒等病毒即使在冷藏溫度下仍具有傳染性。此外，當食物解凍時，任何已存在於食物中的微生物也會再度活躍起來。

急速冷藏是商業上用於快速冷卻水果、肉類及魚類等食物，使用的是攝氏零下30度至40度的高速冷空氣。在急速冷藏櫃中，食物在三小時內便可完成冷卻，少於傳統冷藏櫃所需時間的一半。急速冷藏的好處在於能更好地確保食物的品質。在快速冷卻的過程中，食物中形成的冰晶體積較小，因而減少細胞受損，得以保持食物的質感。

食物可以冷藏多久？

肉類等食物如按照建議貯存於攝氏零下18度或以下的雪櫃冰格內，可以保存6至12個月。保存時間因食物而異，產品標籤一般會提供貯存時間指示。冷藏本身大致上不會破壞營養素。在冷藏期間，肉類及家禽中的營養素(例如蛋白質值)變化不大。

有人可能會擔心，貯存在冰格中的食物會變得乾韌、變色或結滿冰晶。這些都是凍燒的跡象，會影響食物的品質，但不影響安全。食物變色仍可供安全食用，而凍燒的部分可按需要在烹煮之前或之後除去。為了避免凍燒，在冷藏前應把食物妥為包好或入盒。

安全地解凍冷藏食物

雖然像餃子及雜菜粒等一口大小的食物可以不經解凍便烹煮，但生肉及家禽等體積較大的食品在烹煮前必須妥為解凍。仍未解凍或部分解凍的食物需要較長時間烹煮，以防止食物只有表面煮熟，但內裏仍未煮熟，含有有害細菌。

冷藏食物應放在攝氏0度至4度的雪櫃內解凍，以抑制解凍期間細菌的生長。其他方法包括以流動冷水或微波爐解凍。在進行解凍時，應把冷藏食物放在防漏的容器中，以防止交叉污染。

以流動冷水或微波爐解凍的食物在解凍後必須立即烹煮，因為食物可能已置於有利微生物生長的危險溫度範圍(攝氏4度至60度)。至於冷藏的即食食品，例如生蠔及魚生，由於不會再經烹煮，應放在雪櫃內解凍，以遠離危險溫度。切勿在室溫下解凍食物。不要再次冷藏已解凍的食物，除非食物是以正確方式在雪櫃中解凍。

注意事項

- 雖然冷藏可使食物中的酶及有害微生物失去活性，但無法殺滅細菌及病毒。以正確方式處理冷藏食物是十分重要的。

Aside from [canning](#), freezing is a common means for preserving food. Unlike canning, however, freezing not only aids in maintaining food quality, but also preserves the viability of some disease-causing microorganisms. This article discusses how freezing extends the shelf life of food and the precautions that consumers should take when handling frozen food.

How Does Freezing Preserve Food?

Freezing extends the shelf life of food as storing food at -18°C can inactivate enzymes and microorganisms including bacteria, yeasts and moulds in food. By freezing, the water in food turns into ice crystals and becomes unavailable to microorganisms that need it to grow. Parasites like *Trichina* can also be destroyed at [freezing temperatures](#). However, freezing does not kill bacteria and viruses, and viruses like norovirus remain infectious even at freezing temperatures. Besides, any microorganisms present can also become active again when the food is defrosted.

Blast freezing is used commercially to freeze food such as fruits, meat and fish quickly, with the use of high velocity cold air at -30°C to -40°C . Food can be frozen in a blast freezer within three hours, which is less than half of the time required for a conventional freezer. The benefit of blast freezing is that it better ensures food quality. Fast freezing processes form smaller ice crystals in food, which reduces cell damage and preserves food texture.

How Long Can Food be Frozen?

Foods such as meat can be kept in the freezer at -18°C or below for 6 to 12 months as recommended. Keeping times vary depending on the food, and product labels generally provide the indication of keeping time. Freezing itself in general does not destroy nutrients. There is only little change in nutrients such as protein value in meat and poultry during freezer storage.

Some may be concerned about food becoming tough, shriveled, discoloured in spots, or covered in ice crystals when stored in the freezer. These are signs of freezer burn which affects food quality but not safety. Food with colour change is safe to consume, while freezer-burnt parts can be removed before or after cooking as desired. To avoid freezer burn, wrap or package the food properly before freezing.

Defrost Frozen Food Safely

While bite-sized foods like dumplings and mixed vegetables can be cooked without defrosting, bigger items like raw meat and poultry must be properly defrosted before cooking. A longer cooking time is required if the food is still frozen or partially frozen to prevent the outside of the food being cooked, but the interior undercooked and harbouring harmful bacteria.

Frozen food should be defrosted in the refrigerator at 0°C - 4°C to inhibit bacteria growth during defrosting. Other alternatives include defrosting under cold running water or in a microwave oven. When defrosting, frozen food should be packed in a leak-proof container and separated from other food to prevent cross-contamination.

Foods thawed under running water or in a microwave oven should be cooked immediately after defrosting as they may be exposed to the Temperature Danger Zone between 4°C and 60°C that favours microbial growth. For frozen ready-to-eat items, such as raw oysters and sashimi, they should be defrosted in the refrigerator to stay away from dangerous temperatures since they will not be cooked further. Food should not be defrosted at room temperature. Do not refreeze defrosted food unless it has been properly thawed in refrigerator.

Key Points to Note

- While freezing inactivates enzymes and harmful microorganisms in food, it does not kill bacteria and viruses. Proper handling of frozen food is essential.



圖2：食物妥為包好或入盒(左)；放在攝氏0度至4度的雪櫃內解凍(右)
Figure 2: Proper wrapping or packaging (left); defrosting food in the refrigerator at 0°C - 4°C (right)

- 把冷藏食物放在攝氏0度至4度的雪櫃內解凍是首選的方法。在雪櫃內解凍可能需時較長，應預先計劃。
- Defrost frozen food inside the refrigerator at 0°C-4°C is the preferred method. Defrosting in the refrigerator may take time and need to plan ahead.
- 使用微波爐或流動冷水解凍是可行的選擇，但食物解凍後應立即烹煮。
- Defrost using a microwave oven or cold running water are possible options but the food should be cooked immediately after defrosting.

朱古力中的沙門氏菌 Salmonella in Chocolate

最近，比利時一間工廠生產的某品牌朱古力產品進行全球回收，原因是在該廠以及歐美各地150宗的沙門氏菌食物中毒個案中，發現了相同的鼠傷寒沙門氏菌株。雖然朱古力受污染引致大規模爆發沙門氏菌感染的事故並不常見，但由於涉事產品分銷世界各地，因此一旦發生事故，便會在一段時期內影響到廣大地區的許多人。

朱古力脂肪含量高，可保護沙門氏菌免遭胃酸殺滅，得以存活，並且菌量低已可導致食物中毒。此外，為了保持口感，朱古力的加工溫度往往不足以殺死沙門氏菌。因此，如果使用的任何材料或生產環境受到污染，沙門氏菌便可存留在朱古力中。

因應這次事故，食物安全中心(食安中心)已指令進口商回收受影響產品，加強抽驗相關產品，並透過食物警報及業界警報就事故通知市民及業界。食安中心會繼續與海外當局聯絡和採取適當行動。

Recently, there has been a worldwide recall of a brand of chocolate products produced in a factory in Belgium, after the same strain of *Salmonella* Typhimurium was found in the factory as well as in over 150 *Salmonella* food poisoning cases across Europe and America. While large outbreaks of *Salmonella* infections caused by tainted chocolate are not commonly reported, they have been known to impact many individuals over large areas over a certain period of time due to global distribution of affected products.

In chocolate, the high fat content protects *Salmonella* from stomach acid, allowing the bacteria to live and cause food poisoning at a low infective dose. Furthermore, to preserve the texture, chocolate is often processed at temperatures inadequate to kill *Salmonella*. Therefore, the bacteria can remain in chocolate if any of the materials used or the manufacturing environment is contaminated.

In response to the incident, the Centre for Food Safety (CFS) has instructed the importer to recall the affected products, stepped up testing of related products, and notified the public and the trade of the incident through Food Alerts and Trade Alerts. The CFS will continue to liaise with overseas authorities and take appropriate actions.

「食電視」食物安全節目頻道啟播 The Launch of the CFS 'EAT TV' Food Safety Channel

繼推出深受好評的「食安電影頻道」後，食物安全中心(食安中心)開展了全新的網上超短片宣傳活動，名為「食電視」食物安全節目頻道。活動讓市民能夠從娛樂中獲得重要的食物安全信息，並藉著食安中心吉祥物食安仔與食安妹妹的推廣，掌握更安全、更健康的飲食之道。

短片內容輕鬆風趣，涵蓋廣泛的食物安全題材，例如河豚中的河豚毒素、進食「生冷」食物存有的風險，以及妥善貯存外賣食物以免食物中毒的重要性。短片每集均有不同的故事，並在結尾提供實用的食物安全貼士。

「食電視」食物安全節目頻道現已在食安中心的YouTube頻道啟播，並在食安中心的Facebook及Instagram專頁同步上映。歡迎介紹親友收看這系列短片。

The Centre for Food Safety (CFS) has launched a brand-new online short video campaign, 'EAT TV' Food Safety Channel, to complement the well-received 'Foodsafe Movie Channel'. The programme shares important food safety messages with the public through entertainment, using the CFS' mascots, On and Mui, to promote a safer and healthier diet.

The humorous short videos cover a variety of food safety topics, such as tetrodotoxin in puffer fish, the inherent risk of consuming high-risk food, and the importance of proper storage of takeaway food to avoid food poisoning. Each short video tells a different story and concludes with practical food safety tips.

The 'EAT TV' Food Safety Channel is now available on the [CFS' YouTube channel](#), as well as on the [CFS' Facebook](#) and [Instagram](#) pages. Please share the video series with your family and friends.



風險傳達工作一覽 (二零二二年四月)

Summary of Risk Communication Work (April 2022)

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給消費者的食物警報 Food Alerts to Consumers: 5	懷疑食物中毒個案通報 Suspected Food Poisoning Alerts: 0	教育研討會/ 演講/ 講座/ 輔導 Educational Seminars/ Lectures/ Talks/ Counselling: 29	上載到食物安全中心網頁的新訊息 New Messages Put on the CFS Website: 44	