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## 焦點個案

### Incident in Focus

## 經巴士德消毒奶類中的蠟樣芽孢桿菌

### *Bacillus cereus* in Pasteurised Milk

Reported by Ms Iris CHEUNG, Scientific Officer,  
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食物安全中心風險傳達組  
科學主任張鳳文女士報告

### Background

In June 2018, the Food Surveillance Programme of the Centre for Food Safety (CFS) detected excessive *Bacillus cereus* at a level of 4.6 million per gram in a packed pasteurised milk collected at a local supermarket. In September, in response to a food complaint, another packed pasteurised milk was found to contain *Bacillus cereus* at an excessive level of 3.8 million per gram. According to the Microbiological Guidelines for Food of CFS, if a ready-to-eat food contains *Bacillus cereus* at a level of more than 100 000 per gram, it is considered unsatisfactory. This article discusses *Bacillus cereus* in milk from the perspective of Hazard

### 背景

二零一八年六月，食物安全中心(中心)透過食物監察計劃在本地一間超級市場採樣，結果從一個經巴士德消毒的盒裝牛奶樣本檢出過量蠟樣芽孢桿菌，含量為每克四百六十萬個。中心其後在九月跟進一宗食物投訴，從另一個經巴士德消毒的盒裝牛奶樣本檢出過量蠟樣芽孢桿菌，含量為每克三百八十萬個。根據中心的《食品微生物含量指引》，即食食品每克含超過十萬個蠟樣芽孢桿菌即屬「不滿意」。本文將從食物安全重點控制的角度討論奶類中的蠟樣芽孢桿菌，以及在生產和貯存奶類的過程中有何措施抑制蠟樣芽孢桿菌的生長。

### 奶類的生產過程

流程圖所示為奶類的一般生產過程。首先從農場收集生乳，將之運送到奶品加工廠後，便會進行加熱處理，以消滅有害和令奶類

腐壞的微生物。經加熱處理的奶類隨即進行無菌包裝，並送遞到超級市場等各個零售點出售。

### 奶類中的生物危害：蠟樣芽孢桿菌

世界各地據報均曾發現有奶類含蠟樣芽孢桿菌，而在農場(例如土壤、擠奶設施，以及奶品加工廠的表面與設備中)都曾檢測到。蠟樣芽孢桿菌可產生耐熱的



奶類的一般生產過程及控制重點

The general milk production process and critical control points

### Production of Milk

The flow diagram illustrates the production process of milk in general. After collecting raw milk from farm and transporting to a milk processing plant, raw milk will undergo heat treatment to destroy harmful and spoilage

microorganisms. The heat-treated milk is then packaged aseptically and delivered to various retail outlets such as supermarkets for sale.

### *Bacillus cereus*, a Biological Hazard in Milk

Occurrence of *Bacillus cereus* in milk has been reported worldwide. This bacterium has been detected on farms (e.g. soil), milking facilities as well as surfaces and equipment in milk processing plants. It can form heat-resistant spores

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Incident in Focus

孢子和毒素，加熱也不能將其消除。飲用受過量蠟樣芽孢桿菌污染的奶類可能會引致食物中毒，徵狀包括嘔吐及/或腹瀉。

奶類生產的控制重點

在食物安全重點控制系統中，某些食物製造步驟尤為重要，必須設立控制措施以消除或降低食物安全危害，這些步驟就是控制重點。在奶類生產過程中，適當的加熱處理及低溫貯存便是控制重點的好例子。

巴士德消毒法是一種業內常用以保存奶類的熱處理方法。與消毒法不同的是，巴士德消毒法通常在攝氏100度以下進行(例如以攝氏72度加熱15秒)，在冷凍貯存下奶類的保質期可延長數天。巴士德消毒法的目的是把生乳中的有害微生物減少至可接受的水平，而不會對奶類的色香味有顯著影響。在巴士德消毒過程中，大部分以繁殖體形式存在的細菌會大幅減少；然而，可產生耐熱孢子的細菌，例如蠟樣芽孢桿菌及梭狀芽孢桿菌，則能夠存活。

在進行巴士德消毒後，另一個控制重點便是貯存溫度的控制。蠟樣芽孢桿菌的最佳生長溫度為攝氏30度至37度，在攝氏4度以下便停止生長。經巴士德消毒的奶類如置於室溫，蠟樣芽孢桿菌的孢子便會發芽並迅速繁殖，可以致病。因此，經巴士德消毒的奶類必須冷凍貯存於攝氏4度或以下。

不充分的巴士德消毒過程及不適當的貯存溫度會引致奶類不能供安全飲用。在生產層面，應嚴密監察進行巴士德消毒的溫度與時間，以確保有害微生物得以消滅。奶類經巴士德消毒後，在食物鏈各個環節(例如運送包裝奶類到零售點、在店鋪展銷及貯存於消費者家中)保持低溫也同樣重要。生產商、零售商及消費者宜把經巴士德消毒的奶類保存於攝氏4度或以下，以抑制蠟樣芽孢桿菌及其他微生物的生長。

注意事項：

1. 飲用受蠟樣芽孢桿菌污染的奶類可能會引致食物中毒。
2. 巴士德消毒法可殺死奶類中蠟樣芽孢桿菌的繁殖細胞，但無法消滅這種細菌所產生的孢子。
3. 經巴士德消毒的奶類如貯存於攝氏4度以上，蠟樣芽孢桿菌的耐熱孢子會發芽並迅速生長。

給業界的建議

1. 在生產奶類及奶製品時奉行優良製造規範，並推行食物安全重點控制系統。
2. 在進行巴士德消毒後把冷鏈溫度維持於攝氏4度或以下：
  - 嚴密監察冷凍運輸車、冷凍櫃及展銷用雪櫃的溫度。
  - 備存溫度記錄，並遵守溫度要求。

給市民的建議

1. 購買經巴士德消毒的奶類時檢查其食用期限，並在購買後盡快冷凍貯存。
2. 把需要冷凍貯存的奶類及奶製品保持於攝氏4度或以下，或遵照食物標籤上的貯存指示。
3. 容易腐壞的奶類及奶製品在開封後應盡快飲用或食用。

and produce toxin which cannot be destroyed by heat. People consuming milk contaminated with excessive *Bacillus cereus* may suffer from food poisoning with symptoms such as vomiting and/or diarrhoea.

Critical Control Points in Milk Production

In a HACCP system, some steps of the food production are particularly important at which control measures are essential for eliminating or reducing the level of a food safety hazard. These steps are known as critical control point (CCP). In milk production, adequate heat treatment and low temperature storage are examples of CCP.

Pasteurisation is a commonly used heat treatment for preserving milk in the industry. Unlike sterilisation, it is usually performed at a temperature below 100°C (e.g. 72°C for 15 seconds) and the shelf-life of milk can be extended to several days under refrigerated storage. It aims at reducing harmful microorganisms in raw milk to an acceptable level while does not significantly affect the organoleptic properties (e.g. taste) of the milk. During pasteurisation, most bacteria in vegetative state are reduced to a very low level; however, heat-resistant spores produced by spores-forming bacteria such as *Bacillus cereus* and *Clostridium spp.* are able to survive.

After pasteurisation, another CCP will be the control of storage temperature. *Bacillus cereus* grows best at 30°C to 37°C but stops multiplying at below 4°C. If pasteurised milk is being left at room temperatures, spores of *Bacillus cereus* will germinate and grow quickly to levels that cause illnesses. Therefore, it is important to refrigerate the pasteurised milk at or below 4°C.

Inadequate pasteurisation and temperature abuse during storage will render the milk unsafe to consume. At the manufacturing level, pasteurisation temperature and time should be monitored closely to ensure harmful microorganisms are destroyed. Maintenance of low temperatures of the pasteurised milk along the food chain (e.g. transportation of packed milk to retail outlets, display for sale at stores and storage at consumers' homes) is equally important. Manufacturers, retailers and consumers are advised to keep the pasteurised milk at or below 4°C so that the growth of *Bacillus cereus* and other microorganisms are limited.

Key Points to Note:

1. Consuming milk contaminated with *Bacillus cereus* may cause food poisoning.
2. Pasteurisation kills the vegetative cells of *Bacillus cereus* in milk but does not destroy the spores produced by this bacterium.
3. Heat-resistant spores of *Bacillus cereus* will germinate and multiply quickly if pasteurised milk is stored at above 4°C.

Advice to the Trade

1. Observe Good Manufacturing Practice (GMP) and implement HACCP system in the production of milk and dairy products.
2. Maintain the cold chain at 4°C or below after pasteurisation.
  - Closely monitor the temperatures of chilled trucks for delivery, storage chillers and display fridges for sale.
  - Keep record and adhere to the temperature requirement.

Advice to the Public

1. Check the use by date of pasteurised milk at the point of purchase. Refrigerate it as soon as possible after purchase.
2. Keep milk and dairy products that require refrigeration at 4°C or below, or follow the storage instructions provided on the food label.
3. Consume perishable milk and dairy products as soon as possible after opening.





# 參閱營養標籤以防患上高血壓及冠心病

## Read Nutrition Labels for Preventing Hypertension and Coronary Heart Disease

食物安全中心風險評估組營養科主任梁喜媚女士及科學主任林伏波博士報告

Reported by Ms Amy Leung, Dietitian, and Dr Violette LIN, Scientific Officer, Risk Assessment Section, Centre for Food Safety

預先包裝食品上的營養標籤，是有助我們達致飲食健康的工具。在上期文章中，我們討論了如何參閱營養標籤來選擇更健康的食物，從而預防患上糖尿病及肥胖症。今期我們會談談世界衛生組織(世衛)有關預防高血壓及冠心病的飲食建議，以及如何在這方面應用營養標籤。

Nutrition labels on prepackaged foods are a tool that helps us in achieving healthy eating. In the last article, we discussed how to read the labels and choose a healthier food for preventing diabetes and obesity. In this article, we talk about the World Health Organization (WHO)'s dietary advice on preventing hypertension and coronary heart disease (CHD) as well as the use of nutrition labels on these conditions.

### 高血壓及冠心病

鈉是影響血壓的主要因素之一，攝取過量的鈉會增加患上高血壓的風險。至於進食過多高脂(尤其是飽和脂肪及反式脂肪)、高鈉及高糖的食物(見上期)，則會增加患上冠心病的風險。為了預防高血壓及冠心病(以及此病的風險因素，例如高脂血症)，便要飲食均衡，維持適當的體重與腰圍，並實踐健康的生活模式。

### Hypertension and CHD

Sodium is one of the key factors affecting blood pressure. Excessive sodium intake increases the risk of developing high blood pressure. Also, eating too much food high in fat (especially saturated fat and trans fat), sodium, and sugar (see [previous issue](#)) increases the risk for CHD. To prevent hypertension and CHD (and its risk factor such as hyperlipidaemia), we should follow a balance diet, maintain optimal body weight and waist circumference, and adopt a healthy lifestyle.

### 世衛有關預防高血壓及冠心病的飲食建議

要預防高血壓及冠心病，世衛建議成年人每日的鈉攝取量應少於2000毫克，即略少於一平茶匙食鹽。至於每日從飽和脂肪及反式脂肪攝取的膳食攝入量，則應分別少於每日所需總能量的10%及1%。個人攝入量會因應能量需要而有所增減。以一個每日攝取2000千卡能量的成年人為例，每日攝入的飽和脂肪應少於20克，反式脂肪則少於2.2克。

### WHO's Dietary Advice on Preventing Hypertension and CHD

To prevent hypertension and CHD, the WHO advises that an adult should limit dietary sodium intake to less than 2000 mg which is slightly less than one teaspoon of salt.

Moreover, the daily energy intake from saturated fat and trans fat should be less than 10% and 1%, respectively of total energy intake. While individual intake amounts may be higher or lower depending on energy requirements, an adult with a 2000-kcal diet, for example, should get no more than 20g and 2.2g of saturated fat and trans fat, respectively.

### 善用營養標籤

一些預先包裝食品可能屬高鈉(鹽)(例如鹽焗果仁、薯片、火腿)，另一些則含高量飽和脂肪(例如肉腸、醃製肉類)或反式脂肪(例如人造牛油、酥皮餅)。飽和脂肪及反式脂肪均會增加血液內壞膽固醇的水平，而反式脂肪更會降低血液內好膽固醇的水平。如果你關注高血壓及冠心病，參閱營養標籤時，便要查看這些營養素的含量(即鈉、飽和脂肪及反式脂肪)。查看的目標，是要選擇這三種營養素含量較低的食品。

讓我們以兩款餅乾(假設的營養素成分)為例，練習一下如何利用下列三個貼士選擇鈉、飽和脂肪及反式脂肪含量低或較低的食品。



營養資料 Nutrition Information	
每100克/per 100g	
能量/Energy	XX千卡/kcal
蛋白質/Protein	XX克/g
總脂肪/Total fat	XX克/g
飽和脂肪/Saturated fat	2.0克/g
反式脂肪/Trans fat	0.5克/g
碳水化合物/Carbohydrates	XX克/g
糖/Sugars	XX克/g
鈉/Sodium	700毫克/mg

營養資料 Nutrition Information	
每100克/per 100g	
能量/Energy	XX千卡/kcal
蛋白質/Protein	XX克/g
總脂肪/Total fat	XX克/g
飽和脂肪/Saturated fat	1.6克/g
反式脂肪/Trans fat	0.4克/g
碳水化合物/Carbohydrates	XX克/g
糖/Sugars	XX克/g
鈉/Sodium	110毫克/mg

兩款含不同分量鈉、飽和脂肪及反式脂肪的餅乾  
Two packs of biscuits with different sodium, saturated fat and trans fat contents.

### Use of Nutrition Labelling

Some prepackaged foods may be high in sodium (salt) (e.g. salted nuts, chips, ham), others in saturated fat (e.g. sausages, cured meats) and trans fat (e.g. margarine, pastry). Both saturated fat and trans fat raise the bad cholesterol level in blood. Trans fat also lowers the good cholesterol in blood. Look for these nutrients (sodium, saturated fat and trans fat) when reading nutrition labels if you are concerned about hypertension

and CHD. The goal is to choose a food lower in these three nutrients.

Let's practise choosing foods with low or lower sodium, saturated fat and trans fat by using two packs of biscuits with hypothetical nutrient profile as an example according to the three tips below.

### 貼士1：食品有沒有任何營養素含量聲稱？

有一些預先包裝食品的標籤列出「低鹽」、「無鹽」、「低飽和脂肪」或「不含反式脂肪」等聲稱，這些食品都必須符合法例所規定就這些營養素含量作出「低」或「無」的聲稱條件。為方便市民選擇少鹽或少糖的食品，一些食品可根據預先包裝食品「鹽/糖」標籤計劃展示有關標籤。在本例中，餅乾B列出「低鹽」聲稱，是較餅乾A更佳的选择。

### Tip 1: Any Nutrient Content Claim on a Product?

Some labels of prepackaged food contain claims such as "low salt", "no salt", "low saturated fat" or "trans fat free". They are required to meet the legal claim conditions of "low" or "no" of the mentioned nutrients. To facilitate the public to select foods with less salt or sugar, some products may display the labels under the ["Salt/Sugar" Label Scheme for Prepackaged Food Products](#). In this example, Biscuits B with the claim "Low Salt" is a better choice than Biscuits A.

### 貼士2：哪款食品的鹽、飽和脂肪或反式脂肪含量較低？

你可以比較餅乾的營養素含量。作出比較時，要採用相同的參考量(例如每100克的鈉含量)。宜經常選擇鈉、飽和脂肪及反式脂肪含量較低的食品。在本例中，餅乾B是較餅乾A為佳的選擇，因為所含的鈉、飽和脂肪及反式脂肪分量較低。如果

### Tip 2: Which Product Has Lower Salt, Saturated Fat or Trans Fat?

You can compare the biscuits for nutrient content. Use the same reference amount

食品的參考量不同(例如一款食品以每100克標示,另一款則以每食用分量標示),緊記作出換算。

### 貼士3: 食品提供的鹽、飽和脂肪及反式脂肪分量佔每日攝取上限的多少?

無論選擇哪款餅乾,把營養素的攝取量與每日攝取上限加以比較,並計算同日內從其他食物攝取的這些營養素有多少。在本例中,100克餅乾B所提供的鈉、飽和脂肪及反式脂肪分量,分別佔每日攝取上限的5.5%(即110毫克/2000毫克)、8%(即1.6克/20克)及18%(即0.4克/2.2克)。

總括而言,為了預防高血壓及冠心病,便要善用營養標籤,選擇鈉含量及飽和脂肪與反式脂肪總和含量均較低的食物,並按照個人需要參閱營養標籤。

(e.g. sodium content per 100g) when making comparison. It is better to choose one with lower sodium, saturated fat and trans fat more often. In this example, Biscuits B is a better option than Biscuits A because of lower sodium, saturated fat and trans fat. Remember conversion is required if they are of different reference amounts (e.g. one product in per 100g and another in per serving).

### Tip 3: How Much Salt, Saturated Fat and Trans Fat Intake Contributed by the Product?

No matter which pack of biscuits is chosen, compare the nutrients intake with the daily intake, and consider the intake of these nutrients from other foods in a day. In this example, 100g of Biscuits B contributes 5.5% (i.e. 110mg/2000mg), 8% (i.e. 1.6g/20g) and 18% (i.e. 0.4g/2.2g) of your daily sodium, saturated fat and trans fat intake limits, respectively.

In summary, to prevent hypertension and CHD, use the nutrition label and choose a food that is lower in sodium and lower in combined amount of saturated fat and trans fat, and read the nutrition labels according to your needs.

#### 食物事故點滴

#### Food Incident Highlight

## 亞鐵氰化鉀用作鹽的抗結劑

### Potassium Ferrocyanide Used as an Anticaking Agent in Salt

近日內地社交媒體有傳言聲稱,鹽之中的亞鐵氰化鉀危害健康。事實上,根據《食品法典委員會食物添加劑通用標準》,亞鐵氰化鉀(國際編碼系統編號536)、亞鐵氰化鈉及亞鐵氰化鈣(535及538)均可用作鹽的抗結劑(防止粉狀及粒狀材料結塊的物質)。內地、美國、加拿大、歐盟成員國、澳洲及新西蘭等多個國家,都准許使用亞鐵氰化鉀、亞鐵氰化鈉及/或亞鐵氰化鈣作為抗結劑。

有人或會擔心,在煮食時加熱亞鐵氰化物會釋出有毒的氰化物(俗稱山埃)。然而,由於鐵與氰化物之間的化學鍵十分堅固,一般煮食溫度是無法把亞鐵氰化物分解為氰化物的。國際食物安全當局已評估過亞鐵氰化鈉/鉀/鈣的安全性,結論認為現行的核准用途及使用分量並無安全問題。

Recently, there have been rumors circulating on the social media in mainland China claiming that potassium ferrocyanide in salt is hazardous to health. In fact, potassium ferrocyanide (INS no. 536) as well as sodium and calcium ferrocyanides (535 and 538) can be used as anticaking agents (substances that prevent powdered and granulated ingredients from lumping) in salt under Codex General Standard for Food Additives. Potassium, sodium and/or calcium ferrocyanides are permitted anticaking agents in many countries such as mainland China, the United States, Canada, European Union member countries, Australia and New Zealand, etc.

Some people may worry that toxic cyanide will be released when ferrocyanides are heated during cooking. However, because of the strong chemical bond between iron and the cyanide, usual cooking temperature is unable to break down ferrocyanide to cyanide. International food safety authorities have evaluated the safety of sodium/potassium/calcium ferrocyanides and concluded that there is no safety concern in current authorised use and use levels.

## 燕麥片中的草甘膦

### Glyphosate in Oats

最近有報刊報道,在燕麥片中驗出除草劑草甘膦。國際癌症研究機構把草甘膦歸類為「可能令人類患癌」(第2A組),儘管聯合國糧食及農業組織/世界衛生組織農藥殘留聯合會議、歐洲食物安全局及其他海外有關當局,對於草甘膦與人類癌症之間的關係至今未有定案。為了保障食物安全,香港以至世界各地均訂定了最高殘餘限量,作為規管食物中草甘膦及其他除草劑含量的方式之一。

根據《食物內除害劑殘餘規例》(第132CM章),燕麥片中的草甘膦最高殘餘限量為每公斤30毫克,與食品法典委員會所採用的標準一致。中心一直透過食物監察計劃抽取燕麥片樣本進行草甘膦檢測,結果全部合格。進食一般食用量的燕麥片產品,消費者無須憂慮。

Recently, there have been news and publications regarding the herbicide glyphosate found in oatmeal. The International Agency for Research on Cancer (IARC) has classified glyphosate as “probably carcinogenic to humans” (Group 2A), though Joint FAO/WHO Meeting on Pesticide Residues (JMPR), European Food Safety Authority (EFSA) and other relevant overseas authorities could not establish linkage between glyphosate and cancer in humans at this stage. Setting Maximum Residue Limits (MRLs) is one of the approaches in regulating levels of glyphosate and other herbicides in foods worldwide including Hong Kong to safeguard food safety.

Under the Pesticide Residues in Food Regulation (Cap.132CM), MRL of glyphosate in oats is 30 mg/kg which is the same standard adopted by the Codex Alimentarius Commission (Codex). CFS has been collecting oatmeal samples under the food surveillance programme for testing glyphosate and so far all samples were satisfactory. There is no cause for concern over usual consumption of oatmeal products by consumers.

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