

食物安全焦點

Food Safety Focus

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焦點個案 Incident in Focus

雞蛋上的細菌：我們應否清洗雞蛋？ Bacteria on Eggs – Should Eggs be Washed?

食物安全中心

風險評估組

科學主任莊傑傑博士報告

Reported by Dr. Ken CHONG, Scientific Officer,

Risk Assessment Section,

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今年十一月十八日，傳媒報道本港大學一項調查發現，多國進口的雞蛋在蛋殼上和蛋液內均含有大量細菌，引起市民關注雞蛋的安全問題。

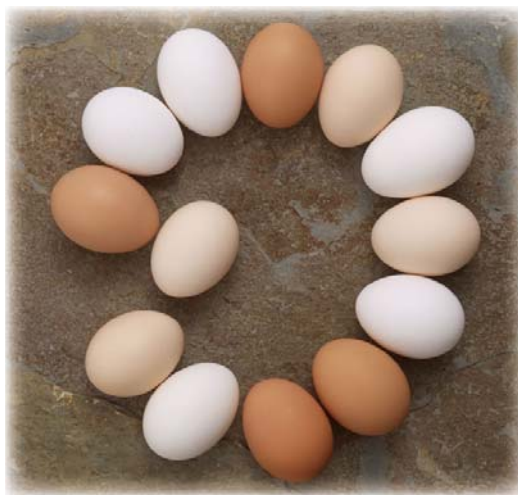
雞蛋的污染

母雞並不是在無菌的環境中生蛋。事實上，雞蛋可能會透過兩種不同途徑受污染：經卵巢的直向傳播；或經蛋殼滲透的橫向傳播。在直向傳播的情況下，細菌會在蛋殼形成之前由受感染的生殖組織感染雞蛋。這種傳播方式大多數與致病細菌(即沙門氏菌)有關。至於橫向傳播，則通常由蛋殼上的糞便污染造成，因為雞蛋是經泄殖腔產出，而該處亦是排糞的地方。此外，雞蛋還可透過環境媒介(如雞農、寵物或齧齒目動物)受到污染。

細菌可能會透過蛋殼上的小孔或裂紋進入蛋內。雖然蛋殼上有許多小孔(介乎6 000至10 000個)，但亦有一層稱為“表層膜”的保護外膜，可阻止蛋殼上的細菌滲進蛋內。由於蛋殼上的裂紋可讓細菌進入雞蛋內部，故業界不應出售有裂紋的雞蛋。此外，細菌亦可能在我們打開雞蛋的一刻污染蛋液。

細菌數量與食物安全

有關調查計算了蛋殼上和雞蛋內的細菌數量。需氧菌落計數是指在培養脂板上生長的菌落數，當中包括天然存在於大部分食物中的細菌和食物受污染後而存在的細菌。細菌數量是用來顯示食物的衛生情況，而不是食物的安全問題，因為細菌數量並不代表測試的食物樣本含有致病菌。此外，由於雞蛋可在排出過程中和接觸環境後受細菌污染，故在有殼雞蛋的表面找到細菌不足為奇。該調查發現蛋殼表面的總細菌數量約達1 500 000個，但細菌其實正常存在於環境中。以人體不同部位為例，每平方厘米亦可能有一萬至一百萬個菌落形成單位不等的細菌數量。



雞蛋 Egg

On 18 November 2008, the media reported that a study conducted by a local university found high bacterial counts on egg shells as well as in liquid egg samples imported from various countries. The report raised some concerns over food safety of eggs.

Contamination of Eggs

Eggs are not laid in a sterile environment. In fact, eggs may be contaminated via two different routes: vertical transmission through the ovary or transovarial or horizontal transmission through the shell or trans-shell. Through vertical transmission, bacteria are introduced from infected reproductive tissues to eggs prior to shell formation. This form of transmission is mostly associated

with pathogenic bacteria, namely *Salmonella*. Horizontal transmission usually occurs from faecal contamination on the egg shell as the eggs are released via the cloaca, where the excretion of faeces also takes place. It also includes contamination through environmental vectors, such as farmers, pets and rodents.

Bacteria may enter through pores or cracks on shell of eggs. Although there are numerous pores (ranging from 6 000 – 10 000) on the egg shell, there is an outer layer of protection called cuticle that can help to retard the penetration of bacteria on egg shells. As eggs with cracks on the shell allow the entry of bacteria into the egg content, cracked eggs should be removed from sale. In addition, bacteria may contaminate egg contents at breaking.

Bacterial Count and Food Safety

In the study concerned, the numbers of bacteria on the shells and inside the eggs were count. Aerobic colony count is a count of viable bacteria, which includes those that occur naturally in most foods and those present through contamination, based on counting of colonies grown on nutrient agar plate. The bacterial count is employed to indicate the sanitary quality but not safety of foods, because it does not indicate the presence of pathogen in the tested food samples. In addition, it is not surprising to find bacteria on the surface of the shell eggs since eggs can be tainted with bacteria during release and following exposure to the environment. The total numbers of bacteria found on the shells in the study were up to about 1.5 million colony-forming unit (cfu). However, bacteria normally exist in the environment. For instance, different areas of human body may have bacterial counts varying from ten thousand to one million cfu per cm².

焦點個案
Incident in Focus

我們應否清洗雞蛋？

既然雞蛋表面可能存在大量細菌，我們應否清洗雞蛋？我們不需清洗雞蛋，由於弄濕蛋殼可能有利微生物進入蛋內(相信微生物會跟水透過毛細作用從小孔滲入蛋內)。殘留在蛋殼表面上的水可能有助蛋殼上的細菌繼續生存。此外，不當清洗亦可能破壞表層膜。

許多市面上出售的雞蛋在商業加工處理過程中實際上已作清洗。為盡量減低微生物進入蛋內的機會，清洗工作需以指定方式進行。當母雞下蛋後，工人會盡快清洗雞蛋，棄掉有裂紋的雞蛋，並以不會破壞表層膜的特別清潔劑為雞蛋表面進行消毒。清洗雞蛋的水溫應高於雞蛋的溫度，但又不能太熱，以免破壞表層膜，而較冷的水會增加細菌進入蛋內的機會。雞蛋在清洗後立即弄乾，有時還可能會噴上一層礦物油，以替代在清洗期間可能會洗去的原有表層膜。

注意重點：

1. 由於弄濕蛋殼可能有利微生物進入蛋內，故我們不需清洗有殼雞蛋。
2. 由於雞蛋在排出過程中和接觸環境後會接觸到細菌，故在有殼雞蛋的表面找到細菌不足為奇。
3. 細菌數量多並不代表食物含有致病菌。

Should Eggs be Washed ?

Since there may be plenty of bacteria on egg surface, should eggs be washed? Shell eggs need not be washed as any process that wets the shell may facilitate the entry of microorganisms, presumably due to water entry through the pores together with microorganisms by capillary action. Water left on shell surface may also enhance the survival of microorganisms on egg shells. In addition, improper washing may damage the cuticle.

Many eggs sold on the market have actually been cleaned during commercial egg processing. The cleansing work needs to be conducted in a controlled manner in order to minimise the entry of microorganisms. The eggs are washed as soon as possible after they are laid and eggs with cracks are removed. The surface of the eggs is sanitised with special detergents that do not damage the cuticle. Water used for washing should be warmer than the temperature of eggs, but not too hot that will damage the cuticle. Cooler water will facilitate the entry of bacteria into the eggs. After washing, the eggs are dried immediately. In some cases, the eggs may be sprayed with a layer of mineral oil to replace the original cuticle that may be lost during washing.

Key Points to Note:

1. Shell eggs need not be washed as any process that wets the shell may facilitate the entry of microorganisms.
2. It is not surprising to find bacteria on egg shells since eggs can come into contact with bacteria during release and following exposure to the environment.
3. High bacterial count does not implicate the presence of pathogens.

給消費者的建議

- 向信譽良好的可靠供應商購買雞蛋。遵照雞蛋包裝／標籤上的食用日期和貯存溫度。
- 在一般情況下，雞蛋是不用清洗的，但雞蛋若遭禽鳥糞便污染，可用水清洗（如有需要，可用家居洗滌劑輔助清洗）。清洗後，應立刻把雞蛋煮熟。
- 避免進食生或未經徹底煮熟的雞蛋和蛋類製品，尤其是長者、嬰兒和孕婦。雞蛋應徹底煮熟至蛋黃和蛋白完全凝固。

Advice to Consumers

- Purchase eggs from reliable and reputable suppliers. Observe the expiry date and storage temperature on the package/label of eggs.
- As a general rule, shell eggs need not be washed. However, if eggs are soiled with faecal matter, they can be washed (with household detergent if required). Washed eggs should be used immediately.
- Avoid eating raw or inadequately cooked eggs and egg products, particularly so for the elderly, infants and pregnant women. Eggs should be thoroughly cooked until the yolk and white are firm.

給業界的建議

- 把有殼雞蛋存放在雪櫃內。
- 避免生蛋與其他食物交叉污染。徹底清潔與生蛋接觸的表面和用來處理生蛋的用具。
- 選用經巴士德消毒的蛋類製品或已乾製的雞蛋粉製作不需要熱處理的食物，尤其是即食甜品。
- 避免使用有裂紋的雞蛋，因為它們較容易受污染，故對健康造成較大的風險。

Advice to Trade

- Store shell eggs under refrigeration.
- Avoid cross-contamination between raw eggs and other food. The food contacting surface and utensils used for preparation of raw eggs should be cleaned thoroughly.
- Choose pasteurised eggs products or dried egg powder to prepare dishes not requiring heat treatment, in particular ready-to-eat desserts.
- Avoid using cracked eggs as they are more likely to be contaminated and thus present a higher health risk.

風險傳達
工作一覽
Summary of
Risk Communication Work

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營養素與健康：能量及蛋白質

Nutrient and Health - Energy and Protein

食物安全中心
風險傳達組
科學主任馮慧中女士報告

Reported by Ms. Jacqueline FUNG, Scientific Officer,
Risk Communication Section,
Centre for Food Safety

由今期開始，營養系列將會集中探討個別營養素。首先，我們會介紹能量及蛋白質。能量是維持我們日常活動的動力，而蛋白質則是促進我們生長和發育的物質。

能量

假如說身體是一部機械，那麼食物就是燃料。再確切一點來說，食物中的碳水化合物、脂肪和蛋白質可為身體機能和體能活動提供能量(見表1)，但它們可產生的能量值並不相同(見表2)。每克脂肪所產生的能量較碳水化合物或蛋白質高出兩倍以上。身體的新陳代謝會把這三種營養素轉化為能量，並將多餘的能量以脂肪的形式貯存。換言之，不論是碳水化合物、蛋白質或脂肪，如沒有消耗的話，都會轉化為脂肪貯存在體內。當身體貯存的脂肪日多，我們的體重便會增加。

表1

世界衛生組織就產能營養素制定的人羣營養素攝入量目標

- 碳水化合物 = 能量攝入量的55-75%
- 蛋白質 = 能量攝入量的10-15%
- 脂肪 = 能量攝入量的15-30%

表2

營養素的能量含量：

- 1克碳水化合物 = 4千卡路里
- 1克蛋白質 = 4千卡路里
- 1克脂肪 = 9千卡路里
- 除了碳水化合物、蛋白質和脂肪外，酒精亦可提供能量(1克酒精 = 7千卡路里)

備註：

- 千卡路里(千卡)和千焦耳(千焦)均為能量的計算單位。
- 1千卡路里約相等於4.2千焦耳。

能量需要量會因人而異，受多項因素影響，包括食物熱效應(處理食物所需的能量)、基礎代謝率和體力活動量。根據中國營養素推薦攝入量，低體力活動量的成年男性及女性每天的能量需要分別約為2 400千卡及2 100千卡。為維持體重，我們攝入的能量必須與消耗的能量保持平衡，因此，如要控制體重，我們可減少攝入的能量及/或增加活動量。

蛋白質

身體會利用蛋白質建構和修復所有組織。氨基酸是蛋白質的基本組成單位，當中有九種屬於必需氨基酸(見表3)，人體不能自行合成或無法合成足夠數量滿足需要，因此，這九種必需氨基酸是我們飲食中不可或缺的元素。一般而言，動物性蛋白質由於含有所有必需氨基酸，故被視為完全蛋白質，而植物性蛋白質(除大豆蛋白質)則會缺少一種或以上必需氨基酸，例如穀類缺少賴氨酸，豆類缺少蛋氨酸，兩者都是九種必需氨基酸之一。對於嚴格奉行素食的人而言，專家建議他們的飲食應包括各種不同植物性來源的食物，以便不同的食物互補不足(即某一食物來源所缺少的某一種必需氨基酸亦可由另一食物來源提供)，令素食者即使不吃肉亦能從飲食中攝取到所有的必需氨基酸。

Starting from this issue, the nutrition series will focus on selected nutrients. To begin with, we introduce the power that keeps us moving (i.e. energy) and the substance that helps us growing (i.e. protein).

Energy

If the body is a machine, then food is the fuel. Being more specific, carbohydrates, fat and protein in foods provide energy for body functions and physical activities (see table 1). They, however, do not produce the same amount of energy (see table 2). Fat produces more than two times energy per gram than either carbohydrates or protein. Metabolism in the body converts carbohydrates, protein and fat into energy. Any excess of these nutrients will be stored as fat in the body. In other words, regardless of whether it is carbohydrates, protein or fat, it will be converted into fat storage in the body if it is not used. As our body fat accumulates, our body weight increases.

Table 1

World Health Organization's Population Nutrient Intake Goals on Energy-producing Nutrients

- Carbohydrates = 55-75% of energy contribution
- Protein = 10-15% of energy contribution
- Fat = 15-30% of energy contribution

Table 2

Energy Content of Nutrients :-

- 1 gram of carbohydrates = 4 kilocalories
- 1 gram of protein = 4 kilocalories
- 1 gram of fat = 9 kilocalories
- In addition to carbohydrates, protein and fat, alcohol can also provide energy (1 gram alcohol = 7 kilocalories)

Note :-

- Kilocalorie (kcal) and kilojoule (kJ) are measuring units for energy.
- 1 kilocalorie is approximately equal to 4.2 kilojoules.

The energy requirements of individuals vary according to several factors, including the thermic effect of food (the energy required to process foods), the basal metabolic rate and the physical activity level. With reference to the Chinese Recommended Nutrient Intake (RNI), the energy requirements for an adult male and female with light physical activities are around 2 400 kcal and 2 100 kcal per day respectively. For weight maintenance, it is important to balance energy intake and energy used. Therefore, to help control the body weight, one can decrease the energy intake and/or increase physical activities.

Protein

The body uses protein to build and repair all body tissues. Amino acids are the building blocks of protein. There are nine essential amino acids (see table 3), which the body cannot make or cannot make enough to meet the needs. Therefore, they are essential components of our diet. Generally, protein from the animal source is considered as complete protein since it contains all the essential amino acids, whereas protein from the plant source, except soy protein, is limiting in one or more essential amino acids. For example, grains are limited in lysine and legumes are limited in methionine, two of the nine essential amino acids. For strict vegetarians, it is recommended that their diet should include a mix of foods from various plant sources, so that different foods complement each other (i.e. the essential amino acid missing from one source is supplied by another), making a meatless diet to be one with all the essential amino acids.

表3

九種必需氨基酸		
組氨酸	賴氨酸	蘇氨酸
異亮氨酸	蛋氨酸	色氨酸
亮氨酸	苯丙氨酸	纈氨酸

蛋白質缺乏的情況在本港並不常見，但蛋白質-能量營養不良則是全球最普遍的營養不良問題之一，在非洲十分普遍。至於另一個極端的情況，過量攝入蛋白質不會對健康帶來額外的益處，因為身體沒有消耗的額外蛋白質將會轉化為脂肪貯存在體內。在轉化過程中，蛋白質會被分解，多餘的氮會排出體外，因而增加肝臟及腎臟的負擔。由於腎病病人須特別留意這個問題，故通常建議他們選吃優質蛋白質，但應限制蛋白質攝入量。

根據中國營養素推薦攝入量，低體力活動量的成年男性及女性每天應分別進食75克及65克蛋白質。至於兒童、青少年、孕婦及授乳婦女，則需要更多蛋白質，以促進生長和發育。

肉類、家禽、魚類、蛋類及乾豆類均可提供豐富的蛋白質。根據健康飲食金字塔，這些食物位於金字塔的第三層，即應該“適量進食”。以實際分量而言，一名成年人每天應進食5至6兩(相等於200至240克)肉類。

我們將會在下一期詳細介紹碳水化合物這種可為人體提供較佳能量來源的常量營養素。

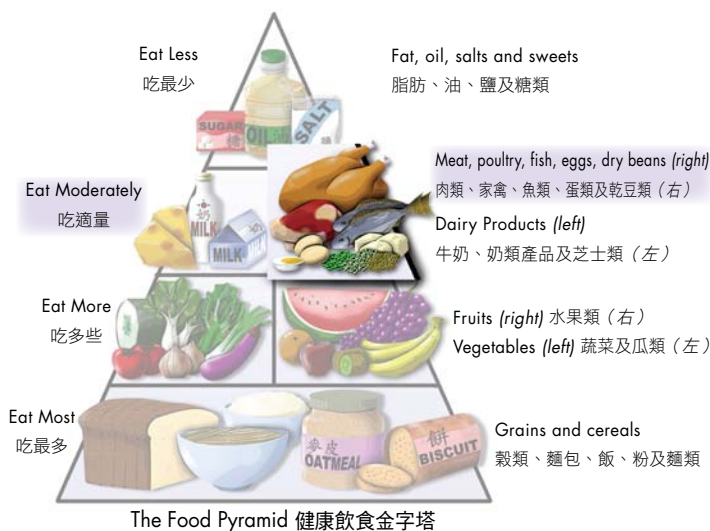


Table 3

Nine Essential Amino Acids		
Histidine	Lysine	Threonine
Isoleucine	Methionine	Tryptophan
Leucine	Phenylalanine	Valine

Protein deficiency is not common in Hong Kong. However, Protein-energy Malnutrition (PEM) is one of the world's most widespread malnutrition problems, which is prevalent in Africa. At the other end, excess intake of protein offers no extra health benefits as additional protein that is not used by the body will be converted to fat. During the conversion, protein is being broken down and excess nitrogen is being excreted, thereby putting extra stress on the liver and kidneys. This is a particular concern for individuals with kidney diseases. Thus, patients with kidney disease are often advised to consume a diet with protein that is of good quality, but in limited quantity.

According to the Chinese Recommended Nutrient Intake (RNI), an adult male and female with light physical activity levels should consume 75 g and 65 g of protein per day respectively. Children, teenagers, pregnant and lactating women need more proteins for growth.

Meat, poultry, fish, eggs and dry beans are good sources of protein. With reference to the Food Pyramid, it is the third-level up under the "Eat Moderately" level. In terms of actual amount, an adult should eat 5-6 taels (equivalent to 200-240 g) of meat a day.

In the next issue, we will examine another macronutrient - Carbohydrates: the body's preferred energy source.

食物事故點滴
Food Incident Highlight

膠樽裝水含異味

日本最近發生了兩次有關進口礦泉水含異味的消費者投訴事件，牽涉的兩個不同牌子均採用聚對苯二甲酸乙二醇酯膠樽作為容器。有關問題可能是因膠樽在航運或貯存的环境中污染到微量的難聞化學物而導致。這兩個牌子的本港進口商已證實，在本港出售的有關產品並非來自問題批次。

聚對苯二甲酸乙二醇酯是一種塑膠，常用來製造飲料樽。雖然這種物料公認具有柔韌度高、化學穩定性強和質料輕巧等多種優良特性，但卻會吸收氣味。

即使這種膠樽沾染到的難聞化學物可能對人體無害，而且分量通常很小，但消費者可能會因氣味難聞而拒絕接受有關產品。食物業在貯存樽裝水時應遠離油漆、有機溶劑等難聞的化學物，以減低受污染的機會。

Strange Smell in Water Packaged in Plastic Bottles

Recently, there were two separate incidents in Japan where consumers complained of strange smell in two different brands of imported mineral water in plastic PET bottles. It was possible that the minute quantity of odorous chemicals picked up by the bottles from the surroundings during shipping or storage had caused the problem. The importers of both brands in Hong Kong have confirmed that the products sold locally are not from the affected batches.

PET (polyethylene terephthalate) is a type of plastic which is commonly used for making beverage bottles. Although PET is known for its desirable properties like good tensile strength, high chemical resistance, light weight etc., it is not impermeable to odours.

Even though the odorous chemicals picked up by the plastic bottles may not be harmful and the quantity is often quite small, consumers may find the smell unacceptable and reject the products. Food business should store bottled water away from odorous chemicals like paint, organic solvents etc. in order to minimise the chance of contamination.

副溶血性弧菌與雙貝類海產

根據衛生防護中心的資料，副溶血性弧菌是二零零七年本港食物中毒呈報個案中最常見懷疑致病媒介，佔整體個案的35%。

副溶血性弧菌喜歡在鹹水中生活，常見於魚類及貝類海產居住的河口和近岸水域。副溶血性弧菌可引致食物中毒症狀，如腹痛、腹瀉和嘔吐，有時會出現發燒，病情通常為輕微至普通。

雖然副溶血性弧菌常見於海產，但徹底煮熟食物可輕易殺死此菌，因此，大家必須徹底煮熟食物才進食，並防止熟食再受生的食物污染。

Vibrio parahaemolyticus and Bivalve Shellfish

According to the Centre for Health Protection, *Vibrio parahaemolyticus* (VP) was the top suspected causative agent for reported food poisoning outbreaks in Hong Kong in 2007, which accounted for 35% of the cases.

VP is a bacterium that likes to live in salt water and is commonly found in estuaries and coastal waters where fish and shellfish live. VP can cause food poisoning symptoms like abdominal pain, diarrhoea, vomiting and sometimes mild fever. The disease is usually mild to moderate.

Although VP is commonly found in seafood, it can be easily destroyed by cooking thoroughly. Therefore, it is important to cook food thoroughly before consumption and to prevent re-contamination of cooked food with raw food.