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減低進食蠔隻對健康的風險

Minimising Health Risk on Oyster Consumption

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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蠔是濾食性動物，容易受可構成食物安全風險的病原體及化學品污染，從而構成潛在安全風險。進食受污染的蠔可能引致食物中毒及健康問題。本文將重點講述蠔隻對健康的危害，及本港對這些危害所進行的監測，並就如何降低進食蠔隻面對的食物安全風險提供建議。

Oysters are filter feeders and susceptible to contamination from both pathogens and chemicals, which pose potential food safety risks. Consuming contaminated oysters can lead to food poisoning and health problems. This article will highlight the health hazards of oysters, surveillance conducted to monitor these hazards locally, and provide advice for lowering food safety risks from the consumption of oysters.

Hazards of Oysters

(i) Chemical Contaminants

Since oysters constantly draw in water, metallic contaminants such as cadmium, lead and mercury from the environment will be accumulated in oysters, especially in the internal organs and digestive tracts. Many industrial activities can lead to the discharge of metallic contaminants into the sea and hence oyster harvesting areas nearby may experience water pollution. Long-term consumption of oysters containing excessive levels of cadmium and lead may cause adverse health effects on kidneys and neurodevelopment.

蠔隻的危害

(i) 化學污染物

由於蠔隻經常過濾海水，鎘、鉛及汞等來自環境的金屬污染物會積聚在蠔隻體內，特別是在其內臟和消化腸道。多種工業活動均可引致金屬污染物排放到海洋，因此鄰近的捕撈水域或會受到污染。長期進食含過量鎘和鉛的蠔可對腎臟健康和神經系統的發育帶來不良的影響。

(ii) Pathogens

As oysters are usually cultivated in coastal environment, they can be contaminated by microorganisms and pathogens present in sea water, which can result in food poisoning. These include bacteria like *Vibrio parahaemolyticus* and *Vibrio vulnificus*, parasites like *Giardia* and *Cryptosporidium* etc. as well as viruses like norovirus and hepatitis A virus. *Vibrio* bacteria naturally live in coastal waters, whereas the major source of norovirus, hepatitis A and some parasites could be faecal pollution from humans.

(ii) 病原體

蠔隻一般在近岸水域環境飼養，因而或會受海水中的微生物及病原體（包括副溶血性弧菌和創傷弧菌等細菌、藍氏賈第鞭毛蟲和微小隱孢子蟲等寄生蟲及諾如病毒和甲型肝炎病毒等病毒）污染，而引致食物中毒。弧菌天然存在於近岸水域中，而諾如病毒、甲型肝炎病毒和部分寄生蟲則主要來自人類糞便污染。

(iii) 抗菌素耐藥性微生物

進食生或未煮熟的蠔，會較易感染抗菌素耐藥性微生物。無論這些抗菌素耐藥性微生物有否引致疾病，都可能將其抗菌素耐藥性基因轉移到人體內其他細菌，因而影響日後使用的抗生素藥效。

(iii) Antimicrobial-resistant microorganisms

It is more likely to contract antimicrobial-resistant (AMR) microorganisms through eating raw or undercooked oysters. Whether or not these AMR microorganisms can cause illnesses, they may transfer their AMR genes to other bacteria inside the human body, which will affect the effectiveness of the use of antibiotics in the future.

化學危害 Chemical Hazards



工業廢水和燃煤發電廠的金屬污染物（例如汞、砷）
Industrial Wastewater and Coal-burning Power Stations
• Metallic contaminants (e.g. mercury, arsenic)



微生物危害 Microbiological Hazards



住宅污水
• 病毒（例如諾如病毒）
• 寄生蟲（例如藍氏賈第鞭毛蟲）
Domestic Sewage
• Viruses (e.g. Norovirus)
• Parasites (e.g. *Giardia*)



天然存在的細菌
（例如副溶血性弧菌）
Naturally-occurring
Bacteria (e.g. *Vibrio*
parahaemolyticus)

圖1: 蠔隻的危害和污染的可能來源

Figure 1: Possible sources of hazards and contamination for oysters.

蠔隻樣本食物監測

蠔類及相關製品已納入在食物安全中心（食安中心）進行的食物監測計劃抽樣範圍。食安中心對從進口、批發及零售層面抽取的樣本進行化學和微生物測試，以確保食物安全。最近的監測結果顯示，除一個進口生蠔樣本被驗出大腸桿菌含量超標外，其餘樣本的測試結果均令人滿意。隨着吃蠔的季節臨近，食安中心已額外抽取了蠔隻樣本，以保障市民健康。在最近一項時令食品調查中，所有蠔隻樣本的金屬污染物測試結果均令人滿意。

吃蠔時如何降低食安風險？

無論在哪个季節或水域捕撈，蠔隻本質上已存在食物安全風險。到目前為止，並無技術可以保證所有蠔隻均不含危害。保持均衡飲食，並避免過量進食蠔隻，能降低攝入過量金屬污染物的風險。

要減少微生物危害，處理蠔隻時，最好遵從[食物安全五要點](#)。挑選新鮮、外殼完整和沒有異味的蠔隻，並在購買預先包裝的去殼蠔前檢查其食用期限。冰鮮蠔和急凍蠔應分別妥為貯存在攝氏4度及攝氏零下18度或以下，並盡量減少生蠔暴露於室溫的時間。處理蠔隻前要徹底洗手並戴上防護手套。使用不同的砧板和器具分開處理生蠔和熟食/即食食物，以避免污染。每次只供應少量去殼生蠔。蠔隻去殼後必須在攝氏4度或以下冷凍，防止受污染並在一天內食用。非供生吃的蠔要徹底[烹煮](#)，以減低食物中毒的風險。

處理蠔隻時，有多個工序如沖洗和去殼往往是在室溫下進行的。這些處理工序在室溫下進行的時間，不應超過一小時。蠔隻在上菜前放置於室溫下的時間累計不得超過二小時。

注意事項

1. 蠔隻或會帶有化學和微生物危害。
2. 食安中心對蠔類及相關製品進行食物監測。
3. 遵從食物安全五要點，可減少進食蠔隻的食物安全風險。

給市民的建議

- 無論是進食還是購買蠔隻，都應光顧可靠及領有牌照/售賣限制出售食物許可的食物業處所。
- 避免過量進食蠔隻，並保持均衡飲食，以減低攝入過量化學污染物的風險。
- 高危人士，包括長者、嬰幼兒、孕婦及免疫力較弱人士應避免進食生蠔。

給業界的建議

- 蠔隻應購自可靠的供應商，並須附有原產國/地區有關當局簽發的衛生證書。
- 出售生蠔須獲得食物環境衛生署的書面許可/批准。
- 採購在潔淨水域收採的蠔隻。

Food Surveillance on Oyster Samples

Oysters and related products are included in the sampling scope of the Food Surveillance Programme conducted by the Centre for Food Safety (CFS). The CFS carries out chemical and microbiological tests on samples collected at import, wholesale and retail levels to ensure food safety. Recent surveillance findings revealed that apart from one imported fresh oyster sample detected with an excessive level of *Escherichia coli*, the results of the rest were satisfactory. As the season of oyster consumption approaches, extra oyster samples have been collected to safeguard public health. In a recent seasonal food surveillance project, the test results for metallic contaminants in all oyster samples were satisfactory.

How to Reduce Food Safety Risks when Consuming Oysters?

Oysters carry inherent food safety risk regardless of the season and region of harvesting. To date, there is no technology that can guarantee oysters are completely free of hazards. Maintaining a balanced diet and refraining from overindulgence in oysters can reduce the risk of exposure to excessive metallic contaminants.

To minimise the microbiological hazards, it is best to observe the [Five Keys to Food Safety](#) when handling oysters. Choose fresh oysters with intact shells and without abnormal odour, whereas the expiry date of prepackaged shucked oysters should be checked before purchase. Store chilled and frozen oysters properly at or below 4°C and -18°C respectively, and minimise the exposure time of raw oysters to room temperature. Wash hands thoroughly and put on protective gloves before handling oysters. Use different cutting boards and utensils to handle raw oysters and cooked or ready-to-eat food separately to avoid contamination. Only serve shucked raw oysters in small portions. Once shucked, oysters should be chilled at 4°C or below, protected from contamination and used within a day. If oysters are not intended for raw consumption, [cook](#) oysters thoroughly to minimise the risk of food poisoning.

When handling oysters, a number of procedures like rinsing and shucking are often done at room temperature. These handling procedures, when carried out at room temperature, should not exceed one hour. Before serving, oysters should not be left out at room temperature for longer than two hours in total.

Key Points to Note

1. Oysters may carry chemical and microbiological hazards.
2. The CFS conducts food surveillance on oysters and related products.
3. Following the Five Keys to Food Safety can reduce food safety risks of oyster consumption.

Advice to the Public

- Purchase and consume oysters from reliable food premises with licence/restricted food permits.
- Avoid overindulgence in oysters and maintain a balanced diet for minimising excessive exposure to chemical contaminants.
- Susceptible populations including the elderly, infants and young children, pregnant women and individuals with weakened immunity should avoid consuming raw oysters.

Advice to the Trade

- Collect oysters from reliable sources with health certificates issued by relevant authorities of the exporting countries or regions.
- Obtain permission in writing/endorsement from Food and Environmental Hygiene Department before selling raw oysters.
- Source oysters that are harvested from areas of clean water.



圖2: 處理暴露於室溫蠔隻的不同時間
Figure 2: Handling oysters exposed to room temperature for different durations

食物測試與分析 — 如何保證準確度？

Food Test and Analysis - How to Ensure Accuracy?

食物安全中心食物研究化驗所
化驗師王錦祥博士報告

Reported by Dr. Kenny WONG, Chemist,
Food Research Laboratory, Centre for Food Safety

食物業全球化是現代物流的產物。這種流動性推進了國際食品貿易，讓香港從不同地方進口種類繁多的食物。食物測試能識別對健康構成的潛在危害，判斷食物中特定化學品的成分，因此對保障食物安全有重大作用。測試結果的準確度對保障人類健康以至食物供應商的信譽至關重要。錯誤測量污染物及其分量可危害健康，而不正確的測量及假陽性結果則會引起不必要的恐慌。因此，所有食品測試機構均應維持優良的品質系統，以確保測量結果穩健、嚴謹和可靠。

Globalisation of the food industry is a result of modern logistics. This mobility has powered international food trade and led to the import of a vast variety of foods into Hong Kong from different places. To guarantee food safety, food testing plays an important role, as it can identify the potential health hazards and determine the content of particular chemicals in food. The accuracy of the test results is definitely crucial in protecting both people's health and the reputation of food suppliers. While erroneous measurement of contaminants and their quantity can endanger people's health, incorrect measurements and false positive results can cause unnecessary panic. Hence, all food testing organization should maintain a good quality system to ensure rigorous, robust and reliable food testing results.

食物測試的品質系統是什麼？

品質系統指用於執行品質管理的機構資源、過程及程序，主要涉及兩方面 - 品質保證和品質控制。品質系統、品質保證和品質控制三者之間的關係可見於圖3。

品質保證旨在預防品質問題，並確保測量服務的誠信。若獲認可資格頒授機構的認可，便可證明測試機構建立的品質管理系統能得出符合ISO 17025的一般方向規範。例如在香港，香港認可處是第三方認證機構，根據ISO 17025訂立具體要求，並協助向本港測試機構進行評估並發出香港實驗所認可計劃 (HOKLAS) 的證書。

品質控制是保證所有測試結果均是準確可靠的測量過程。就此，食品法典委員會、國際分析化學家協會、國際純化學和應用化學聯合會及國際標準化組織等國際認可的機構及組織已就方法確認、品質控制及測試機構的能力發布有關指引和標準。

測試食物時可能出現的錯誤

甲) 化驗前階段

在進行化驗前，若食物樣本處理不當，便可能會影響測量結果；這些錯誤包括樣本錯調、標籤錯誤、樣本收集方法不當及貯存或運輸欠妥，可引致污染、對錯誤樣本進行化驗及樣本變質，而導致出現錯誤的結果。

要減少分析前出現錯誤，應：

- 嚴謹依循已制定的標準操作程序。
- 清楚標示樣本的收集日期、來源及要進行的測試。
- 在建議的溫度下以適當的容器貯存和運送樣本。

乙) 化驗階段

在化驗階段，測試的過程中可能會發生錯誤，原因可以是使用提取效率和回收率低的不適當方法、化驗條件錯誤（例如溫度不正確）、使用不合適的設備等。

例如，化驗無機砷時，使用提取效率較低的萃取液，或會因而低估樣本中無機砷的實際含量。測試糖果中的阿斯巴甜時，若使用不合適的檢測器（如折光率檢測器而非光電二極體陣列探測器），會影響阿斯巴甜的特定檢測，因而阿斯巴甜的實際含量或會被高估。不適當的化驗條件，例如在化驗階段用以提取食物中殘餘除害劑的度過高，可能會引致樣本中除害劑的實際含量被低估，因為部分種類的除害劑容易於高溫環境中降解。

以下方法可減少這些錯誤發生：

- 因應情況使用經驗證和獲認可的方法化驗某種化學品。
- 嚴謹依循經驗證的測試方法所要求的品質控制措施。
- 維持所有化驗所儀器狀況良好並獲妥為較正。

What is Quality System in Food Testing?

A quality system refers to the organisational resources, processes and procedures to implement quality management, which involve two main aspects – Quality Assurance (QA) and Quality Control (QC). The relationship among quality system, QA and QC can be outline as in Figure 3.

QA is to prevent quality issues and ensure the integrity of the testing service. If accredited by an accreditation body, it can certify that the quality management system set up by the testing organization is capable of producing precise and trustworthy measurements in compliance with the general guidance of ISO 17025. For example, in Hong Kong, the Hong Kong Accreditation Service (HKAS) is the third party accreditation organization, which lay out the specific requirements based on ISO 17025 and helps to assess and grant the certificate of Hong Kong Laboratory Accreditation Scheme (HOKLAS) to the local testing organizations.

QC is a measuring process to provide assurance that all testing results are accurate and reliable. In this regard, internationally recognized bodies and authorities such as CODEX, AOAC, IUPAC and ISO have published relevant guidelines and standards regarding method validation, quality controls and the competence of testing organisations.



圖3: 品質系統、品質保證和品質控制之間的關係
Figure 3: Relationship among the Quality System, Quality Assurance and Quality Control

Potential Errors in Food Testing

a) Pre-analytical Stage

Before analysis, mishandling of food samples may affect the measurement results; these errors include sample mix-up, mislabeling, inappropriate sampling methods and improper storage or transportation. This may cause contamination, analysis of the wrong samples and sample degradation, which leads to false results.

To minimize pre-analytical errors, one should:

- Adhere strictly the established standard operating procedures.
- Label clearly the samples with date of collection, sources and tests to be done.
- Store and transport the samples in appropriate containers and keep them at the recommended temperature.

b) Analytical Stage

In the analytical stage, errors can arise during the process of testing. This could be due to the use of inappropriate methods with low extraction efficiency and recovery, the wrong analytical conditions (e.g. incorrect temperature), the use of unsuitable equipment, etc.

For example, when analysing inorganic arsenic, the use of inappropriate extraction solution with lower extraction efficiency may underestimate the actual amount of inorganic arsenic in the sample. When testing for aspartame in candies, the use of an unsuitable detector, such as refractive index detector instead of photodiode array detector, will affect the specific detection of aspartame and the actual amount of aspartame may be overestimated. The inappropriate analytical condition like the adoption of too high a temperature for the extraction of pesticide residues in food during the analytical stage may underestimate the actual amount of pesticides in the sample. It is because some types of pesticides can degrade easily at high temperature.

These errors can be minimised by:

- Using validated and accredited methods to analyse a particular chemical as appropriate.
- Following strictly the QC measures required in the validated testing methods.
- Maintaining all laboratory equipment in good condition and with proper calibrations.

丙) 分析後階段

分析後的錯誤集中於數據處理過程，包括不正確記錄、計算和詮釋結果。例如，使用錯誤的方程式、已過時的工作表等，可導致錯誤的結果。

要減少這些錯誤發生：

- 確保僅由訓練有素的人員詮釋和記錄結果。
- 經常更新工作表及 / 或方程式和保護它們免受意外更改。

認可和品質系統是支援精準的測試和測量程序不可或缺的要素。因此，建議選用獲認可的分析化驗所進行相關測試。

c) Post-analytical Stage

The post-analytical errors mainly focus on data-treatment process, which include incorrect recording, calculations and interpretation of results. For example, using wrong equations, outdated worksheets etc. could lead to false results.

To minimise these types of errors:

- Ensure that only well-trained personnel interpret and record results.
- Update the worksheets and/or equations frequently and protect them from unintended changes.

Accreditation and quality system are essential components for supporting accurate testings and measurements. Therefore, using analytical laboratories that are accredited for the required tests is recommended.

本地食物中的工業生產反式脂肪酸

Industrially Produced Trans Fatty Acids in Local Food

攝入反式脂肪酸可增加罹患冠心病的風險。反式脂肪酸有兩個主要來源，即天然存在於反芻動物製品（例如奶和牛油）及存在於烘焙、油炸和人造牛油食物的工業生產反式脂肪酸。由於工業生產的反式脂肪酸是從食物攝取反式脂肪酸的主要來源，而且可以用其他食物配料替代，世界衛生組織（世衛）因此制定了目標，[限制食物中工業生產的反式脂肪酸](#)。

為響應世衛的呼籲並配合本港的[行動計劃](#)，食物安全中心（食安中心）已[修訂規例](#)，禁止在食物中使用部分氫化油（即工業生產反式脂肪酸的主要來源）。「部分氫化油」是工業生產的反式脂肪的主要來源。食安中心最近進行的一項有關本地食品中工業生產反式脂肪酸的風險評估[研究](#)顯示，大部分樣本中不含工業生產反式脂肪酸或工業生產反式脂肪酸含量屬低水平。只有六個樣本（4%）含超過世衛指引水平（即每100克總脂肪含2克工業生產反式脂肪酸）。禁止使用部分氫化油的修訂規例已於2023年12月1日開始生效，因此業界應確保食物不含部分氫化油。

The intake of Trans Fatty Acids (TFAs) can increase the risk of coronary heart disease. There are two major dietary sources of TFAs, namely ruminant products (e.g. milk and butter), where TFAs are naturally present, and the industrially produced TFAs (IP-TFAs), where they can be found in bakery, deep-fried or margarine products. The World Health Organization (WHO) targets [limiting IP-TFAs](#) in food as they are the major dietary source of TFAs and can be replaced with alternative ingredients.

In response to the call of WHO and the local [Action Plan](#), the Centre for Food Safety (CFS) has [amended Regulations](#) to ban partially hydrogenated oil (PHO), the main source of IP-TFAs, in food. The CFS's recent risk assessment [study](#) on IP-TFAs in local food found that a majority of the samples contain no or low level of IP-TFAs. Only six (4%) samples contained more than the WHO guidance level of 2g IP-TFAs / 100g total fat. As the Amendment Regulation on banning PHO has come into effect on 1 December 2023, the food trade should ensure that their products do not contain PHO.

小食中的沙門氏菌

Salmonella in Snack Food

食物安全中心（食安中心）在深水埗一家食店抽取的一個即食鹵水豬生腸**樣本**，驗出對致病菌**沙門氏菌**呈陽性反應。經調查後懷疑是由不潔的手套造成的生熟食物交叉污染所致。食安中心已指示有關店鋪暫停出售相關食品，向店員提供食物安全和衛生教育，並要求他們進行徹底清潔和消毒。

要防止交叉污染，食物處理人員應時刻保持個人及環境衛生。工作前後及每當轉換工作崗位（例如處理垃圾後轉為處理食物），或在弄污手部後應妥為洗手。工具和設備使用後要清潔和消毒。使用有蓋垃圾桶，並定時清理。展示和貯存食物時要蓋好。徹底煮熟食物，並把食物保持於危險溫度範圍外。消費者應在購買小食食品後盡快進食。

A ready-to-eat lo mei (marinated) pork oviduct [sample collected](#) by the Centre for Food Safety (CFS) from a food shop in Sham Shui Po was tested positive for the pathogen [Salmonella](#). Cross contamination of cooked food with raw food, possibly through unclean gloves, was the suspected cause upon investigation. The CFS has instructed the shop to suspend the sale of the food product concerned, provided food safety and hygiene education to their staff and requested them to conduct thorough cleaning and disinfection.

To prevent cross contamination, food handlers should maintain good personal and environmental hygiene at all times. Wash hands properly before and after work and whenever changing job (e.g. changing from handling rubbish to handling food) or when hands get dirty. Clean and disinfect utensils and equipment after use. Use covered rubbish bins and empty them regularly. Keep food covered during display and storage. Cook food thoroughly and keep it out of the temperature danger zone. Consumers should consume snack food as soon as possible after purchase.



風險傳達工作一覽（二零二三年十一月）

Summary of Risk Communication Work (November 2023)

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