

食物安全焦點

Food Safety Focus



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Centre for Food Safety

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焦點個案 Incident in Focus

抗生素與食物安全

Antibiotics and Food Safety

食物安全中心
風險評估組
莊富傑獸醫報告
Reported by Dr. Ivan CHONG, Veterinarian,
Risk Assessment Section,
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為了提高全球對抗生素耐藥性問題的認識，世界衛生組織(世衛)於去年年底舉辦了首個“世界提高抗生素認識周”。本文將探討在食用動物身上使用抗生素及其可能衍生的食物安全問題，包括可能在食物中出現的抗生素殘餘及抗生素耐藥菌的形成。

抗生素在食用動物中的應用

抗生素是一種能夠殺滅細菌或抑制細菌生長的藥物，自二十世紀四十年代問世以來，不但廣泛用於人類醫學，亦用於治療動物。世衛指目前生產的抗生素約有半數用於農業，包括養殖食用動物。抗生素被用於治療患傳染病的食用動物；預防疾病或阻止疾病在食用動物間傳播；有些地方為了加快食用動物生長，會在飼料及／或水中加入低劑量的抗生素，以增加食用動物的體重及／或提高飼料利用率。

食物中的抗生素殘餘

與其他獸藥一樣，對食用動物施用抗生素，動物產品(例如肉和奶)中有可能殘留一定的抗生素。雖然有部分抗生素即使在一些食品中有少量殘餘也不構成安全問題，但亦有某些抗生素(例如霉菌素)的殘餘可給公眾健康帶來難以承受的風險，這些抗生素因此被禁止在食用動物中使用。

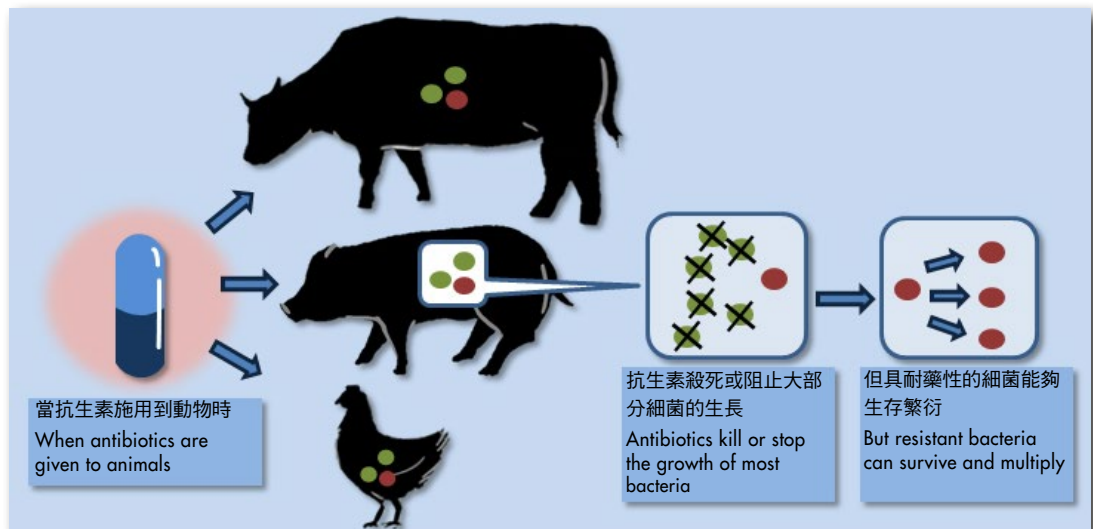
Late last year, the World Health Organization (WHO) held its first World Antibiotic Awareness Week in an attempt to increase awareness of global antibiotic resistance. This article aims to explore the use of antibiotics in food producing animals and their implications to food safety including their potential residues in food and the development of antibiotic resistant bacteria.

Use of Antibiotics in Food Producing Animals

First introduced in the 1940s, antibiotics are medicines that kill or stop the growth of bacteria. Since their introduction, they are widely used in human as well as veterinary medicine. According to the WHO, approximately half of current antibiotic production is used in agriculture including food animal production. Antibiotics are used therapeutically to treat animals with infectious diseases, prophylactically to prevent diseases or their spread within a herd and, in some places, for growth promotion where they are typically given in low doses in the feed and/or water as they increase the rate of weight gain and/or the efficiency of feed utilisation in animals.

Antibiotic Residues in Food

Just like many other veterinary drugs, the use of antibiotics in food animals has the potential to leave residues in animal products such as meat and milk. While low level residues of certain antibiotics are considered safe in some food products, residues of other antibiotics (e.g. chloramphenicol) may pose unacceptable risk to public health and are therefore prohibited to be used in food animals.



施用了抗生素的動物體內出現耐藥細菌(摘自美國疾病控制及預防中心)

Development of resistant bacteria in animals when antibiotics are used (Adapted from US CDC)

在香港，一九八三年起實施的《食物內有害物質規例》(第132AF章)就輸入和出售含有有害物質的食物作出規管。該規例在二零零一年大幅修訂，把抗生素和多種獸藥納入兩個附表中。規例的

In Hong Kong, the Harmful Substances in Food Regulations (Cap. 132AF) (the Regulations) implemented in 1983 govern the import and sale of food containing harmful substances. In 2001, significant enhancements were made to the Regulations to include antibiotics as well as other



附表1目前載列了38種獸藥(大部分是抗生素)在不同食物中的最高濃度限量,包括獸藥名稱、獸藥的描述、食物類別和所容許的最高濃度。附表2則列明了魚、肉類和奶類不得含有的七種獸藥,其中兩種是抗生素。

抗生素耐藥菌的形成和傳播

動物接受抗生素後,腸道的易感細菌被殺滅或抑制,未被殺滅或抑制的耐藥細菌卻同時開始大量繁殖,形成對抗生素有耐藥性的菌群。錯用、濫用或使用抗生素來加快動物生長都有可能加速這個過程,因為長期使用低劑量的抗生素有利於耐藥細菌的生存和生長。人類在處理或進食受污染的食物,或直接與帶菌動物接觸時,都有可能接觸到這些耐藥細菌並受感染。

應否停止對食用動物施用抗生素?

正如世界動物衛生組織指出,抗生素是保障動物健康和福利必不可少的工具。只要使用得當,抗生素亦為滿足全球對安全的動物源性食物(如奶類、肉類、魚和蛋等)與日俱增的需求作出貢獻。沒有抗生素,患有傳染病的食用動物將不能得到有效的治療;一旦食用動物間爆發疾病,就不能得到有效控制和預防。由於現今逾60%的人類病原體源自動物,如生病的食用動物得不到治療,將對食物安全和公眾健康構成風險。

世界動物衛生組織、世衛和聯合國糧農組織(糧農組織)一致建議慎重和負責任地使用抗生素等抗微生物藥物。一般而言,抗生素只應在有真正需要時才使用,而對食用動物施用時應遵從獸醫的監督。食品法典委員會編製的《盡量減少和控制抗微生物藥物耐藥性操作規範》指出,在未經適當的風險分析的情況下,抗生素不應用作促進生長。世衛亦不建議使用抗生素來促進生長。

糧農組織指出,謹慎使用包括抗生素在內的獸藥對動物健康具有裨益。在務農過程明智地使用抗生素能減少細菌出現抗藥性的問題在食用動物中發生及蔓延,減低公共衛生的風險。

注意要點

1. 抗生素是保障動物健康和福利必不可少的工具。
2. 雖然有部分抗生素即使在一些食品中有少量殘餘也不構成安全問題,但亦有某些抗生素(例如氯霉素)的殘餘會給公眾健康帶來難以承受的風險。
3. 錯用和濫用抗生素都有可能加快耐藥細菌的形成。

給消費者的建議

- 應從可靠的店鋪購買動物源性食物。
- 在處理食物(尤其是生肉等動物源性食物)時,應注意衛生,包括接觸生肉後用肥皂洗手。
- 把食物徹底煮熟方可進食。

給業界的建議

- 確保只有在獸醫監督下才對動物施用抗生素。
- 採購動物源性食物時光顧遵守獸藥使用良好規範的供應商。
- 新鮮豬肉、牛肉及羊肉(非冰鮮或冷藏肉類)須來自本地持牌屠房屠宰的牲口。
- 進口冰鮮/冷藏肉類或冰鮮/冷藏禽肉須領有食物安全中心簽發的進口許可證。

veterinary drugs in the two Schedules to the Regulations. Currently, the maximum concentrations of 38 veterinary drugs (the majority of which are antibiotics) in different foods are specified in the First Schedule of the Regulations, in which the name of the veterinary drug, description of the veterinary drug, description of the food and the maximum concentration of that veterinary drug allowed are listed. Moreover, a total of seven veterinary drugs (including two antibiotics) that are prohibited in any fish, meat or milk are listed in the Second Schedule to the Regulations.

Emergence and Spread of Antibiotic Resistant Bacteria

When antibiotics are administered to animals, they kill or stop the growth of susceptible bacteria in the intestine. At the same time, some resistant bacteria in the intestine survive or remain unaffected and multiply, leading to the development of an antibiotic resistant bacterial population. Misuse, overuse or the use of antibiotics for growth promotion can potentially accelerate this process as long-term, low-level exposure to antibiotics may lead to survival and growth of resistant bacteria. Humans can become exposed to and subsequently infected by these resistant bacteria through the handling or consumption of contaminated food or through direct contact with animals harbouring these bacteria.

Should We Stop the Use of Antibiotics in Food Producing Animals?

As pointed out by the World Organisation for Animal Health (OIE), antibiotics are essential tools for protecting animal health and animal welfare. When used appropriately, antibiotics also contribute to satisfying the increasing world demand of safe food of animal origin such as milk, meat, fish and eggs. Without antibiotics, food animals suffering from bacterial infectious diseases will be denied effective treatment and outbreaks of disease may not be effectively controlled or prevented within a herd. With more than 60% of human pathogens today originating from animals, leaving sick food animals untreated poses a risk to both food safety and public health.

The OIE, WHO, as well as Food and Agriculture Organization of the United Nations (FAO) all recommend prudent and responsible use of antimicrobials including antibiotics. In general, antibiotics should only be used when indicated and when used in food animals, they should be under veterinary supervision. Efforts should also be made to reduce the use of antibiotics by implementing good animal husbandry practices. According to the Code of Practice to Minimize and Contain Antimicrobial Resistance prepared by Codex, antibiotics should not be used for growth promotion without appropriate risk analysis. The WHO also advises against the use of antibiotics for growth promotion.

According to FAO, prudent use of veterinary drugs including antibiotics has tremendous benefits to animal health and the judicious use of antibiotics in agriculture should reduce the emergence and spread of resistant bacteria in animals, and minimise public health risks.

Key Points to Note

1. Antibiotics are essential tools for protecting animal health and animal welfare.
2. While low level residues of certain antibiotics are considered safe in some food products, residues of other antibiotics may pose unacceptable risk to public health.
3. Misuse and overuse of antibiotics may accelerate the development of antibiotic resistance.

Advice to Consumers

- Purchase food of animal origin from reliable source.
- Observe good hygiene when preparing food, particularly those from animal origin (e.g. raw meat), including washing hands with soap after contact with raw meat.
- Cook food thoroughly before consumption.

Advice to trade

- Ensure that antibiotics given to animals are only used under veterinary supervision.
- Obtain food of animal origin from sources that follow Good Practice in the Use of Veterinary Drugs.
- Fresh (i.e. not chilled or frozen) pork, beef and goat meat should only be obtained from animals slaughtered in one of the licensed local slaughterhouses.
- Importation of chilled/frozen meat or chilled/frozen poultry meat must be accompanied by an import licence from the Centre for Food Safety.



第1組食物致癌物- 加工肉類與香煙一樣危險?! Group 1 Carcinogens in Food – Is Consuming Processed Meat as Dangerous as Smoking?!

食物安全中心
風險評估組
科學主任游天頌先生報告

Reported by Mr. Arthur YAU, Scientific Officer,
Risk Assessment Section,
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國際癌症研究機構 (IARC) 於二零一五年十月把加工肉類歸類為第1組致癌物(“令人類致癌”), 很多人因而誤以為加工肉類的害處與同屬第1組的其他致癌物(如吸煙、石棉和黃曲霉毒素等)一樣大, 擔憂加工肉類與吸煙一樣是致癌的主要風險因素。

IARC是什麼機構?

IARC成立於一九六五年, 是世界衛生組織屬下推動國際間合作研究癌症的機構, 目的是研究防癌措施, 以及減輕癌症帶來的負擔和痛苦。癌症研究非一國一地之事, IARC致力於統籌跨政府的癌症研究工作, 為各國政府制定癌症政策提供支援, 同時提供具公信力的癌症資訊。

IARC 的評估

IARC定期揀選致癌的媒介進行評估, 被選定的致癌媒介須符合兩個條件: 一是有人類暴露的證據; 二是有或懷疑有致癌證據。致癌性是指可引致癌症的能力或傾向。這些媒介包括化學物、複雜混合物、生物性因子和生活習慣因素, 其中一些直接或間接與飲食有關。物質的致癌性評估過程極其複雜(涉及動物和人體研究、致癌機制和暴露情況等), 並需要作出嚴謹細密的科學判斷, 故通常由IARC等權威癌症研究組織統籌進行。IARC在評估物質對人類的致癌性時, 會通盤考慮所有掌握的證據, 以作出全面的判斷。

IARC的分類

IARC在評估物質的致癌危害(因暴露於該物質而致癌的可能性)時, 會審議相關的人體研究與動物實驗結果以及其他相關數據, 然後根據致癌證據的整體力度, 把物質劃入不同的組別。這個分類純粹是基於致癌證據的力度, 即使是同組的致癌物質, 其風險程度(即致癌的概率)也不相同, 可以差別很大。因此, 把同一組別致癌物的致癌風險相提並論很容易令人誤會。舉例來說, 吸煙、黃曲霉毒素、石棉、酒精飲品、加工肉類雖然同屬第1組, 但它們的危險程度其實是不同的。例如: 每天約吸一包煙(15至24枝煙)的煙民到60歲時的死亡率比從未吸煙人士高出117%; 而每天食用50克加工肉類, 患大腸癌的風險將增加18%。IARC的分類詳述如下:

- 第1組: 令人類患病
 - 對人類致癌性證據充分
 - 例子: 黃曲霉毒素、酒精飲品、苯並[a]芘、鎘、中式鹹魚、六價鉻化合物、二噁英和二噁英樣化合物及加工肉類。
- 第2A組: 可能令人類患病
 - 對人類致癌性證據有限, 但對實驗動物致癌性證據充分
 - 例子: 丙烯酰胺、無機鉛化合物和紅肉。
- 第2B組: 或可能令人類患病
 - 對人類致癌性證據有限, 對實驗動物致癌性證據並不充分; 或對人類致癌性證據不足, 但對實驗動物致癌性證據充分。
 - 例子: 黃曲霉毒素M₁、蕨菜和鉛。
- 第3組: 在會否令人類患病方面未能分類
 - 對人類致癌性證據不足, 對實驗動物致癌性證據不足或有限
 - 例子: 三聚氰胺、棒曲霉毒素和二氧化硫。
- 第4組: 可能不會令人類患病

In October 2015, when the International Agency for Research on Cancer (IARC) classified processed meat as “Group 1” carcinogen (i.e. carcinogenic to humans), many people misunderstood that processed meat may cause as much harm as other IARC group 1 carcinogens like smoking, asbestos, aflatoxins, etc. Members of the public are concerned that processed meat might be a major risk factor like tobacco smoking in causing cancers.

What is IARC?

Established in 1965, the IARC is the agency of the World Health Organization for promotion of international collaboration in cancer research. It aims to find preventive measures and to reduce the burden and sufferings from cancer. The IARC also aims to coordinate cancer research that cannot be easily studied within national borders, support global cancer policy development and act as a source of authoritative information etc.

IARC Evaluations

The IARC regularly selects agents based on the evidence for human exposure and evidence or suspicion of carcinogenicity for evaluation. Carcinogenicity refers to the ability or tendency to produce cancer. These agents include chemicals, complex mixtures, biological agents and lifestyle factors that some of which may be directly or indirectly related to our diets. As evaluation of the carcinogenicity of substances involves complicated processes including animal and human studies, cancer mechanisms and exposure etc. and complex scientific judgement on the findings, the work is often coordinated by esteemed cancer research organisations like IARC. When evaluating the carcinogenicity of substances to humans, the IARC considers the body of evidence as a whole in order to reach an overall evaluation.

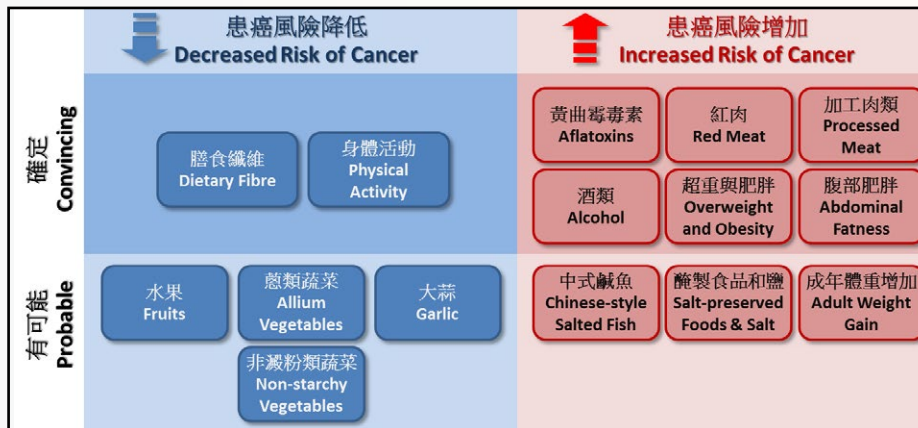
IARC Grouping

The IARC classifies the substances it has evaluated into various groups according to the overall strength of evidence based on cancer hazard (i.e. the potential for the exposure to cause cancer) derived from studies in humans and in experimental animals and other relevant data. As the classification is based on the strength of evidence, it does not mean that substances in the same group carry same level of risk to health as the magnitude of risk (i.e. how likely the cancer will occur) differs greatly. Therefore, comparing the carcinogenic risk of different agents on the same classification (tobacco smoking, aflatoxins, asbestos, alcoholic beverages, processed meat are examples of Group 1 carcinogens) is misleading as they are not equally dangerous. For example, smoking about a packet (15 – 24 pieces) of cigarette each day will lead to 117% excess mortality over lifelong non-smokers when they reach 60 years of age, whereas consuming every 50g of processed meat daily will increase the risk of colorectal cancer by 18%. The details of the classifications are as follows:

- Group 1: Carcinogenic to humans
 - Sufficient evidence in humans
 - E.g.: aflatoxins, alcoholic beverages, B[a]P, cadmium, Chinese-style salted fish, chromium (VI) compounds, dioxins and dioxin-like PCBs, and processed meat.
- Group 2A: Probably carcinogenic to humans
 - Evidence is limited in humans but sufficient in experimental animals
 - E.g.: acrylamide, inorganic lead compound, and red meat.
- Group 2B: Possibly carcinogenic to humans
 - Evidence is limited in humans and is less than sufficient in experimental animals; or evidence is inadequate in humans but is sufficient in experimental animals
 - E.g. aflatoxin M₁, bracken fern, and lead.
- Group 3: Not classifiable as to its carcinogenicity to humans
 - Evidence is inadequate in humans and is inadequate or limited in animals
 - E.g.: melamine, patulin, and sulphur dioxide.
- Group 4: Probably not carcinogenic to humans

膳食中的致癌物質

各種癌症的危險性受飲食、體重和身體活動等多種因素影響（見表）。保持均衡飲食（攝取足夠的膳食纖維和蔬果），多做運動顯然有助預防多種與飲食有關的癌症。另一方面，少吃加工肉類、紅肉和中式鹹魚；少喝酒精飲品；預防肥胖；避免攝入黃曲霉毒素等均可減低患癌風險。



表：患癌風險降低或增加與多種飲食因素和身體活動有關（摘自《癌症圖譜》第二版）
Table: Many diet and physical activity related factors are known to contribute to an increase or decrease in cancer risk. (Adapted from the *Cancer Atlas, 2nd edition*)

Carcinogens in the Diet

A number of factors, including diet, body weight and physical activities (see Table), can affect the risk of various types of cancer. It is obvious that maintaining a balanced diet (with adequate intake of dietary fibres, fruits and vegetables) and maintaining an active lifestyle can help to reduce the risk for a range of food-related cancers. On the other hand, reduction in the consumption of processed meats, red meat, Chinese-style salted fish, and alcoholic drinks, prevent obesity, and avoid intake of aflatoxins, etc. can contribute to cancer risk reduction.

下一期我們會集中探討各種與飲食有關的癌症。

In the next issue, we will focus on various diet-related cancers.

食物事故點滴 Food Incident Highlight

新魚上市—基因改造三文魚

二零一五年十一月，美國食物及藥物管理局批准一款在加拿大和巴拿馬養殖／孵化的基因改造三文魚，這是全球第一種可供人類食用的基因改造魚類。這種基因改造的大西洋三文魚比一般的大西洋三文魚較快長到市售的大小，原因是被注入大鱗大麻哈魚（Chinook salmon）的生長荷爾蒙基因及大洋鱈魚的啟動子（啟動基因表達的一段DNA序列），故全年皆可成長。

美國食物及藥物管理局在審批過程中，已根據有關公司提交的資料對該種基因改造三文魚作嚴格的食物安全評估，例如成長基因、致敏性和營養成分組合（如脂肪酸、胺基酸、維他命和礦物質等）。由於並無發現生物上的相關差異，美國食物及藥物管理局評定這種基因改造三文魚與商業養殖的非基因改造大西洋三文魚一樣可以安全食用，且有同樣的營養價值。

這種基因改造三文魚預計在數年後推出美國市場，屆時美國食物及藥物管理局將進行監察。食物安全中心會繼續留意有關消息。

New Fish on the Block – GM Salmon

In November 2015, the United States (US) Food and Drug Administration (FDA) approved the world's first genetically modified fish (GM salmon) raised/bred in Canada and Panama to be farmed for human consumption. The concerned GM salmon is an Atlantic salmon that grows to market size faster than its non-GM counterpart. It has the growth hormone gene from Chinook salmon and a promoter (a DNA sequence that initiates the process of gene expression) from ocean pout for promoting year-round growth.

As part of the compulsory review process, the FDA has evaluated the information submitted by the concerned company to determine the food safety of the GM salmon, such as growth hormone levels, allergenicity, and nutritional composition (e.g. fatty acids, amino acids, vitamins and minerals). Since no biologically relevant differences were found, the FDA has determined that the GM salmon is as safe and nutritious as non-GM Atlantic salmon raised in different commercial farms.

The FDA will set up post-market surveillance programmes for the GM salmon which may be introduced into the US market in a couple of years. The Centre for Food Safety will keep abreast of the issue.

切勿進食或供應中式魚生

吃中式魚生（即淡水魚魚生）會危害健康。新加坡近月發生多宗與生吃淡水魚有關的乙型鏈球菌感染個案。乙型鏈球菌可感染身體各部分，包括血液、肺部、骨頭和關節。

除了細菌外，生的淡水魚（包括鯪魚、大頭魚和山斑魚）還可能帶有寄生蟲，例如可令肝臟的膽管梗阻、發炎和出現癌症的中華肝吸蟲。本港的腸道寄生蟲感染個案大部分是由中華肝吸蟲所致。

為保障公眾健康，根據《食物業規例》（第132X章），本港禁售中式魚生。消費者無論是在港或外遊，切勿進食生或未徹底煮熟的淡水魚，尤其是在吃火鍋或粥品時，須待魚熟透方可進食。業界不得向消費者供應中式魚生。

Don't Eat or Serve Chinese Yu Sang (Raw Fish)

Consuming Chinese Yu Sang (raw freshwater fish) can be hazardous to health. In recent months, there were outbreaks of Group B streptococcus (GBS) infections in Singapore which were associated with raw freshwater fish consumption. GBS can cause infections in different parts of the body including the bloodstream, lungs, bones and joints.

Apart from bacteria, it is well known that raw freshwater fish including grass carp, bighead carp or snakehead may carry parasites such as Chinese liver fluke which can cause obstruction, inflammation and cancer of the biliary ducts in the liver. Chinese liver fluke contributes to the majority of local human cases of enteric parasites.

In order to protect public health, Chinese Yu Sang is a prohibited food under the Food Business Regulation (Cap 132X) in Hong Kong. Consumers are advised not to eat raw or undercooked freshwater fish while dining locally or travelling and eat freshwater fish only if it is adequately cooked, especially when having hot pot or congee. The trade should not supply Chinese Yu Sang for consumers.

風險傳達 工作一覽 Summary of Risk Communication Work

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