

食物安全焦點

Food Safety Focus



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Centre for Food Safety

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紅麴米與食物安全

Red Fermented Rice and Food Safety

食物安全中心

風險評估組

科學主任周淑敏女士報告

Reported by Ms. Shuk-man CHOW, Scientific Officer,
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上月，本地社交媒體瘋傳有關美國禁售“紅米”的謠言，指稱“紅米”含有一種降膽固醇化學物，會影響肝臟及肌肉。因應有關事件，食物安全中心在其臉書(Facebook)作出回應，指有關指稱是把“紅米”與“紅麴米”混為一談。本文會討論有關“紅米”與“紅麴米”的食物安全問題。

紅米與紅麴米

紅米

紅米是一種全穀米，米粒外包着一層紅色的麩皮。根據聯合國糧食及農業組織，紅米含有豐富的纖維、維他命B及礦物質(例如鐵、鋅)，一般較白米更有營養。世界衛生組織及其他多個衛生機構均建議人們在膳食中加入全穀食物(例如紅米、燕麥)，作為均衡飲食的一部分。紅米與白米混合食用，可增加攝入膳食纖維，並漸受歡迎。

紅麴米

紅麴米是以紅麴菌屬真菌(通常為紅麴菌)發酵的米製成(見圖)。與紅米不一樣，紅麴米不會作為主食。多個世紀以來，紅麴米在亞洲一直用作食用色素、增味劑、肉類防腐劑及釀酒原料。傳統上，紅麴米用於腐乳、米酒及部分中國菜肴。

Last month, a rumour about the prohibited sale of “red rice” in the US went viral on local social media. It was alleged that “red rice” contained a cholesterol-lowering chemical which could affect the liver and muscle. In response to the incident, the Centre for Food Safety debunked the allegation on its Facebook about the muddling of “red rice” and “red fermented rice”. This article discusses the food safety of “red rice” and “red fermented rice”.

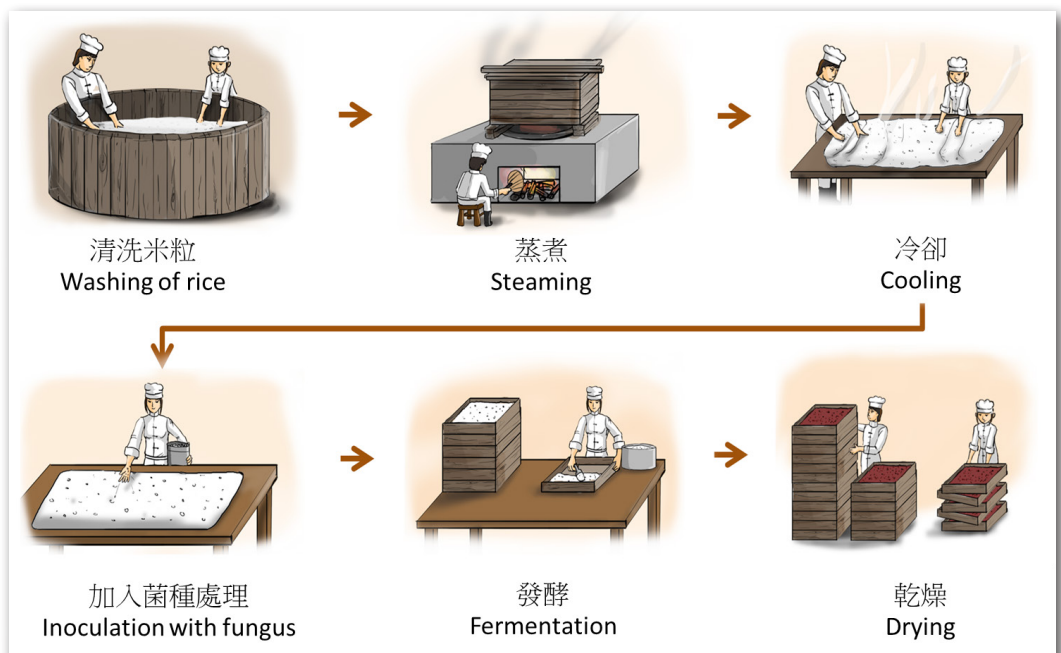
Red Rice versus Red Fermented Rice

Red Rice

Red rice is a type of whole grain rice which has red coloured bran covering the rice kernel. According to the Food and Agriculture Organization of the United Nations, red rice is rich in fibre, B vitamins as well as minerals (e.g. iron, zinc) and is generally more nutritious than white rice. The World Health Organization and many other health authorities recommend including whole grains (e.g. red rice, oatmeal) as part of a balanced diet. Red rice is mixed with white rice to increase dietary fibre intake and is gaining popularity.

Red Fermented Rice

Red fermented rice is produced by fermenting rice with the fungus of the genus *Monascus*, most commonly *Monascus purpureus* (see Fig). Different from red rice, red fermented rice (also known as red yeast rice, monascus, hong qu and angkak) is not consumed as a staple. It has been used as food colourant, flavour enhancer, for meat preservation and wine brewing in Asia for centuries. Traditionally, red fermented rice is used in furu, rice wine, and some Chinese cuisines.



紅麴米是以蒸熟的米經紅麴菌種發酵而製成。

Red fermented rice is made by fermenting steamed rice with fungi of the *Monascus* species.

焦點個案
Incident in Focus

視乎所使用的紅麴菌株及發酵情況，紅麴菌可產生多種物質，包括不同的色素(讓紅麴米有獨特的顏色)及一些藥理學活性物質(例如莫

那可林K)。

紅麴米的安全問題

紅麴米及紅麴色素

紅麴米用作食物配料及藥物已有長遠歷史。在《本草綱目》中，紅麴米稱為不含毒性的產品。不過，相關的國際食品安全機構並無就紅麴米及紅麴色素的毒性進行評估。有關紅麴米及其色素的毒性資料亦相當有限。

莫那可林K

在紅麴發酵期間所產生的莫那可林K與降膽固醇藥物洛伐他汀中的有效成分的化學性質相同。食用含莫那可林K的產品或會影響血液內膽固醇的水平，同時可能引起與服用洛伐他汀一樣的副作用(例如肝中毒及肌肉問題)和藥物相互作用。雖然消費者無法得知紅麴米及其產品中莫那可林K的含量，但美國食品及藥物管理局所進行的檢測顯示，作為食品出售的紅麴米完全不含或只含微量莫那可林K。

在美國，洛伐他汀是獲食品及藥物管理局批准的藥物的有效成分，用作治療血膽固醇過高的病人。一九九八年，美國食品及藥物管理局判定，一款擬作食品補充劑出售的紅麴米產品因含有較大分量的莫那可林K，故屬未經批准的新藥，而非食品補充劑。自此之後，食品及藥物管理局曾數度針對出售含有超過微量莫那可林K的紅麴米產品的公司採取行動。

在歐盟，歐洲食物安全局認為，在一般成年人每天可從紅麴米製品攝入10毫克莫那可林K的情況下，“紅麴米產生的莫那可林K有助維持血膽固醇濃度正常”的健康聲稱便可獲確立。

注意要點：

1. 不應把紅米與紅麴米混為一談。
2. 紅米可作為均衡飲食的一部分，並可供人安全食用。
3. 在內地、日本及台灣，紅麴米用作食物配料已有長遠歷史。

給業界的建議

- 確保食物標籤上的聲稱屬實及無誤導成分。
- 在本港，紅麴米或紅麴色素不可用作食用色素(第132H章)。

給市民的建議

- 在膳食中加入全穀食物(例如紅米)，以作為均衡飲食的一部分。
- 任何人如有意食用紅麴米產品以降低膽固醇，應諮詢醫護人員的專業意見。

Depending on the *Monascus* strains used and the fermentation conditions, various products of *Monascus* spp. may be formed. These include various pigments, which give the distinct colour to red fermented rice, and some pharmacologically active substances (e.g. monacolin K).

Safety of Red Fermented Rice

Red Fermented Rice and *Monascus* Pigments

Red fermented rice has a long history of use as food ingredients and medicine. It is described as a non-poisonous product in *Bencao Gangmu* (《本草綱目》). However, the toxicity of red fermented rice and *monascus* pigments has not been evaluated by relevant international food safety authorities. Toxicological information on red fermented rice and its pigments is limited.

Monacolin K

Monacolin K produced during *Monascus* fermentation is chemically identical to the active ingredient in the cholesterol-lowering drug lovastatin. Consumption of products containing monacolin K may affect blood cholesterol levels and causes the same types of side effects (e.g. liver toxicity and muscle problems) and drug interaction as lovastatin. While consumers have no way of knowing how much monacolin K is present in red fermented rice and its products, tests performed by the US Food and Drug Administration (FDA) indicate that red fermented rice sold as a food product contains no or only traces of monacolin K.

In the US, lovastatin is an active ingredient in FDA-approved drugs used to treat patients with high blood cholesterol. In 1998, the US FDA determined that a red fermented rice product, intended to be sold as dietary supplement, contained a substantial amount of monacolin K was an unapproved new drug, not a dietary supplement. On several occasions since then, the US FDA has taken action against companies selling red fermented rice products that contain more than trace amounts of monacolin K.

In the EU, the European Food Safety Authority considered that the health claim “Monacolin K from red fermented rice contributes to the maintenance of normal blood cholesterol concentrations” was substantiated at daily intakes of 10mg monacolin K from any red fermented rice preparation for adults in the general population.

Key Points to Note:

1. Red rice should not be confused with red fermented rice.
2. Red rice can form part of a balanced diet and is safe for human consumption.
3. Red fermented rice has a long history of use as food ingredient in the Mainland, Japan and Taiwan.

Advice to the Trade

- Ensure claims on food labels are truthful and not misleading.
- Use of red fermented rice or *monascus* pigments as food colourants are not permitted in Hong Kong (Cap 132H).

Advice to the Public

- Include whole grains, such as red rice, as part of a balanced diet.
- Consult medical professionals if one intends to consume red fermented rice products for its cholesterol-lowering effects.

風險傳達 工作一覽 Summary of Risk Communication Work

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“健康一體”與食物安全 – 從農場到餐桌

One Health and Food Safety – From Farm to Table

食物安全中心
風險評估組
吳雪兒獸醫報告

Reported by Dr. Cherrie NG, Veterinary Officer,
Risk Assessment Section,
Centre for Food Safety

我們在上期介紹了“健康一體”的概念，以及一些與“健康一體”中與食物安全有關的主要問題。我們會在今期就“健康一體”的食物安全方面，重點探討食源性疾病，特別是食源性人畜共患病。人-動物-生態系統介面對保障公共衛生相當重要，涵蓋範圍包括人類與動物及動物產品、共同處身的各種環境及生態系統之間的所有直接及間接接觸。在“健康一體”的概念下作出協作及協調，有助加強預防及控制人畜共患病、更有效監察疾病威脅、關顧活生牲畜的健康及飼養環境，從而改善食物安全的監察工作。

食源性人畜共患病 – 一種食源性疾病

食用被微生物或化學物玷污的食品會導致食源性疾病。食源性疾病是全球一個重要的致病及致死的原因，故預防食源性疾病是食物安全不可或缺的一環。**食源性人畜共患病**為一種食源性疾病。食源性人畜共患病是指脊椎動物與人類之間經自然傳播的食源性疾病，例如沙門氏菌病及彎曲菌病。根據世界衛生組織表示，每年有數以百萬計的人因食源性人畜共患病而不適。

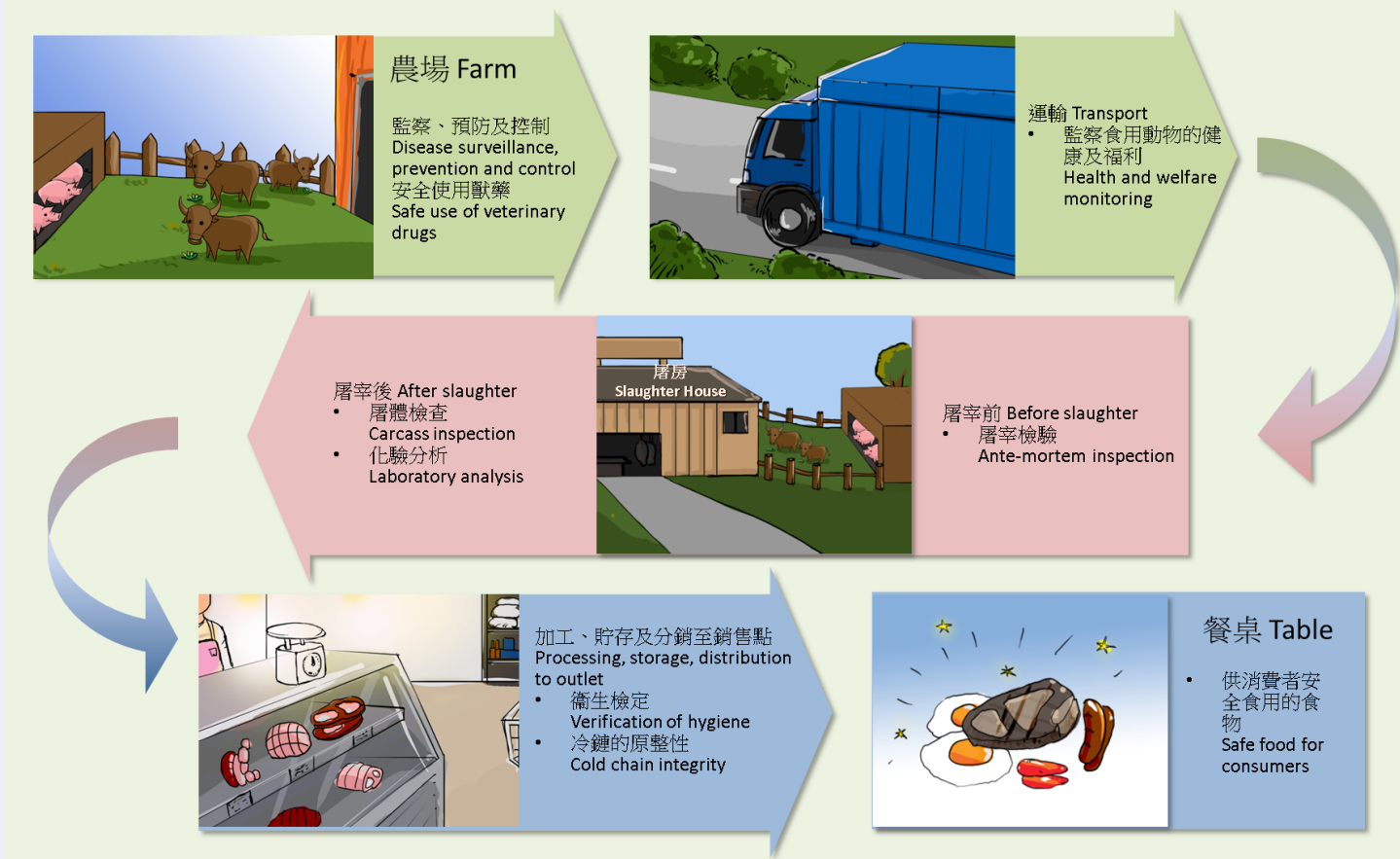
預防食源性人畜共患病由在農場生產食物開始，直至人們在餐桌上享用食物為止，因為食物在其間的不同階段均有可能被污染。以禽肉為例，雞隻在農場可能從環境或飼料接觸細菌，例如沙門氏菌及彎曲菌，導致感染。在屠宰過程中，屠體可能因接觸腸內物而被玷污。若受感染家禽所衍生的產品未經妥善處理，人們食用這些產品可能會患上沙門氏菌病及彎曲菌病。

In the previous issue, we introduced the concept of One Health and some key issues of One Health related to food safety. In this issue, we will put more focus on foodborne diseases, foodborne zoonoses in particular, under the food safety aspect of One Health. The human-animal-ecosystem interface is important to safeguard public health and encompasses all direct and indirect human exposure to animals and animal products and to the various environments and ecosystems that we all share. Collaboration and coordination under the One Health concept can help to improve prevention and control of zoonotic diseases, better monitor disease threats and care for the health of livestock and the environments that they are raised in, all of which can contribute to improving food safety monitoring.

Foodborne Zoonoses - A Type of Foodborne Diseases

Foodborne diseases result from ingesting foodstuffs contaminated with microorganisms or chemicals. Prevention of foodborne diseases is a crucial part of food safety because they are an important cause of morbidity and mortality globally. **Foodborne zoonoses**, being a type of foodborne diseases, are foodborne diseases that are naturally transmitted between vertebrate animals and humans, examples are salmonellosis and campylobacteriosis. According to the World Health Organization, millions of people get sick each year due to foodborne zoonoses.

Prevention of foodborne zoonoses starts where the food is produced, at the farm, to where the food is consumed, on the table, because contamination can occur at different stages of the process. Taking poultry meat as an example, at the farm, the chickens can acquire bacteria such as Salmonella and Campylobacter from the environment or feed, resulting in infection in the chickens. During slaughter, the carcasses can be contaminated, by coming into contact with the intestinal contents of the chickens. Subsequently, human salmonellosis and campylobacteriosis can arise from consuming the products derived from the infected poultry if they have not been properly treated.



在“健康一體”的方式下作出協作

在“健康一體”的方式下作出協作，相關行業人員可參與食品生產的適當階段以改善和更有效監察食物安全的工作(見圖)。

在農場，活生牲畜被飼養作食物，故須進行監察、預防及控制牲畜疾病的工作，並確保安全及合法地使用獸藥。在農場層面，獸醫專業擔當了重要的角色；而化驗資源及全球疾病數據分享方面所作的協作，能更有效預防及控制疾病，能從而有助於在爆發疾病時加強管理和減少經濟損失。環境除了影響牲畜的健康，與消費者的健康亦是息息相關的。食用動物可能會攝入農場的污染物，令食品的安全及質素受威脅，最終影響消費者。

食用動物在離開農場後，便會運往屠房。在屠宰前，牲畜須進行宰前檢驗，以評估活生動物的健康狀況。在屠宰牲畜後，有關人員應檢查屠體，並抽取樣本作化驗分析。至於在屠宰牲畜後進行的加工、貯存及分銷工作直至到達銷售點(例如超級市場及食肆)，均須作衛生檢定和保持冷鏈的完整性。本地及海外各相關行業採取的所有步驟及協作工作，對提供安全的食物供人在餐桌上享用，均十分重要。各方互相合作不可或缺。

Collaboration under the One Health Approach

With the collaboration under the One Health approach, food safety can be improved and better monitored by involving parties from relevant discipline to the appropriate stage(s) of food production (see Fig).

At the farm where livestock are raised for food, there should be surveillance, prevention and control of animal diseases and safe and legitimate use of veterinary drugs should be ensured. At the farm level, the veterinary profession plays an important role and collaboration of laboratory resources and global disease data sharing can greatly facilitate better management and lower economic losses upon disease outbreak with better prevention and control of diseases. Besides health of the animals, the environment is also related to health of consumers. Contaminants in the farm may be ingested by food animals, the safety and quality of the food products would be jeopardised and subsequently affect the consumers.

Food animals are transported to slaughterhouse after leaving the farm. Before slaughter, there should be an ante-mortem inspection check of the animals to assess the health status of the live animals. After slaughter, the carcasses should be inspected and samples should be taken for laboratory analysis. For the processing, storage and distribution after slaughter and subsequently at the outlet, such as supermarkets and restaurants, there should be verification of hygiene and the cold chain integrity should be maintained. All the steps with collaborative efforts of multiple disciplines, both locally and internationally, are important to provide safe food on the table and cooperation among different parties is essential.



食物中的吡咯里西啶生物鹼

食物安全中心進行了一項風險評估研究，以評估食物中的吡咯里西啶生物鹼對健康構成的風險。

某些吡咯里西啶生物鹼為肝毒性及基因毒性的物質，自然存在於多個植物品種。有外國研究顯示，用作糧食及飼料的農作物受雜草污染，往往可導致人類透過穀物或穀類產品、蜜糖、茶、奶、蛋及內臟而攝入吡咯里西啶生物鹼。

是次研究的結果顯示，儘管一些特色茶(例如路依保斯茶(rooibos))及乾香料(例如孜然籽及牛至)樣本的吡咯里西啶生物鹼含量水平較高，但本地市民經膳食途徑攝入吡咯里西啶生物鹼的整體含量甚低，健康受影響的機會不大。

研究結果並無充分理據建議市民改變基本的健康飲食習慣。市民應保持均衡及多元化的飲食。

Pyrrrolizidine Alkaloids in Food

The Centre for Food Safety has conducted a [risk assessments study](#) to assess the health risks of pyrrolizidine alkaloids (PAs) in food.

Certain PAs are hepatotoxic and genotoxic substances found naturally in many plant species. Overseas studies showed that humans could be exposed to PAs through grains or grain products, honey, tea, milk, eggs, offal commonly as a result of contamination of crops that were used as food and feed with wild weeds.

The results of this study showed that the overall dietary exposure to PAs of the local general population was low and unlikely to cause health concern, though some samples of certain specific teas (e.g. rooibos) and dried spices (e.g. cumin seeds and oregano) were found to contain higher levels of PAs.

The findings did not provide sufficient justifications to warrant changes to the basic dietary advice on healthy eating. The public is advised to maintain a balanced and varied diet.

食物中的超廣譜β內酰胺酶(ESBL)耐藥腸桿菌科細菌

上月，一項本地研究指，在100個未經煮熟的生雞肉產品的測試樣本中，約68%檢出含ESBL耐藥腸桿菌科細菌。

ESBL耐藥腸桿菌科細菌是一些對主要抗菌素具抗藥性的細菌，存在於動物及人類的腸道、植物及環境。就食物安全而言，在這些細菌中，只有少數會導致食源性疾病。請注意，這些細菌與非抗菌素耐藥性細菌的反應相若，只要徹底烹煮食物便能殺死細菌。

抗菌素耐藥性是全球公共衛生的一大議題。為此，政府成立抗菌素耐藥性高層督導委員會應對有關問題。食物安全中心會支援委員會的工作。業界及消費者應徹底煮熟食物，防止生熟食物交叉感染，並在處理食材期間保持個人、食物及環境衛生。

Extended-Spectrum β-Lactamases (ESBL)-producing Enterobacteriaceae in Food

Last month, a local study reported that about 68% of the 100 samples of uncooked, raw chicken meat products tested containing ESBL-producing *Enterobacteriaceae*.

ESBL-producing *Enterobacteriaceae* is a variety of bacteria resistant to certain important antimicrobial agents, which originates from the intestinal tract of animals and humans, plants and the environment. As far as food safety is concerned, only a fraction of these organisms could cause foodborne diseases. It is important to note that they behave similarly to non-antimicrobial resistant organisms and can be killed by thorough cooking.

Antimicrobial resistance is a major public health issue in the world. In this connection, the Government has set up the High-level Steering Committee on Antimicrobial Resistance to tackle the issue. The Centre for Food Safety will provide support to the Committee's work. Meanwhile, traders and consumers are reminded to cook food thoroughly, prevent cross-contamination between raw and cooked foods, as well as observe good personal, food and environmental hygiene during food processing.