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典型牛海綿狀腦病（典型瘋牛症）－ 食物安全威脅？

Classical Bovine Spongiform Encephalopathy (BSE) - A Food Safety Threat?

食物安全中心獸醫公共衛生組
B M HWANG 獸醫報告

Reported by Dr. B M HWANG, Veterinary Officer,
Veterinary Public Health Section, Centre for Food Safety

二零二一年九月十七日，英國動植物衛生局證實，在英國薩默塞特的一個農場出現了一宗典型牛海綿狀腦病（典型瘋牛症）個案。本文會全面審視典型瘋牛症，包括其他動物及人類所患的各種傳染性海綿狀腦病、病徵及對公眾健康的影響。本文亦會闡釋為了預防這種疾病透過受污染的牛肉傳播給人類而實施的各項措施。

A single case of classical bovine spongiform encephalopathy (BSE) had been confirmed on a farm in Somerset in England by the UK Animal and Plant Health Agency on 17 Sep 2021. This article examines classical BSE from a broad perspective including the various transmissible spongiform encephalopathies (TSE) in other animals and humans, the disease characterisation and public health concerns. It also details the full suite of measures implemented to prevent this disease from being transmitted to people via contaminated beef.

動物及人類所患的傳染性海綿狀腦病

動物及人類會患上各種傳染性海綿狀腦病，又稱普里昂病。牛隻所患的傳染性海綿狀腦病稱為牛海綿狀腦病，即俗稱的瘋牛症，可分為兩種：牛隻進食受普里昂蛋白污染的飼料後患上的典型瘋牛症，以及相信是自然發生在牛羣中的非典型瘋牛症。其他種類的傳染性海綿狀腦病包括綿羊和山羊的癢病、鹿的慢性消耗病、以及人類的克雅二氏症和「庫魯病」。

TSE in Animals and Humans

There is a group of diseases known as transmissible spongiform encephalopathies (TSE), or prion diseases, affecting both animals and humans. In cattle, this form of TSE is known as BSE, or commonly as “mad cow disease”. Two forms can be distinguished: the classical BSE which occurs in cattle after ingesting prion contaminated feed, while the atypical BSE is believed to occur spontaneously in all cattle populations. Other forms of TSE include scrapie in sheep and goats, chronic wasting disease (CWD) in deer, and Creutzfeldt-Jakob disease (CJD) and “Kuru” in humans.

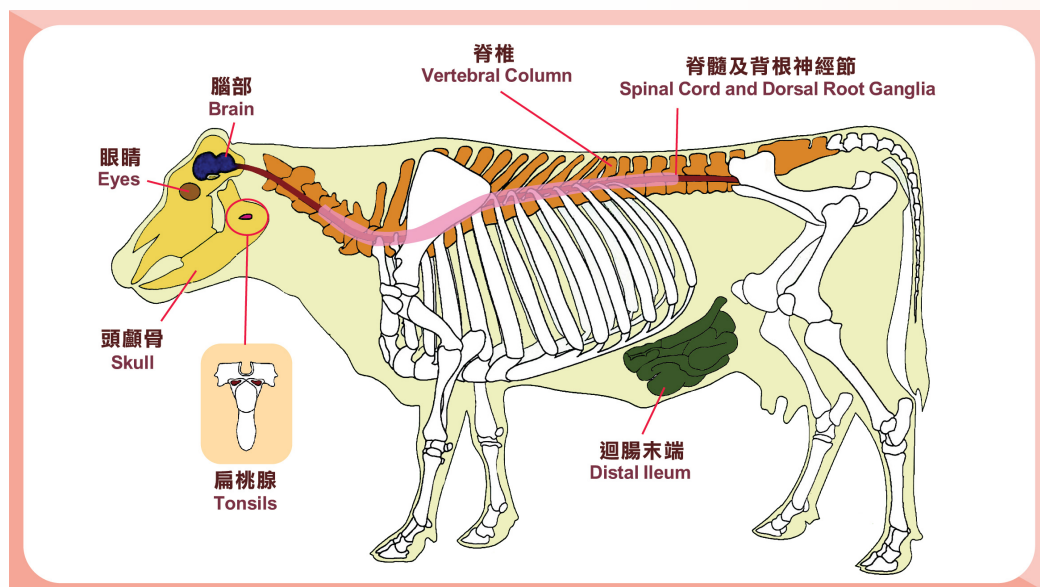


圖1：高風險部位
Figure 1: Specified risk materials

瘋牛症的病徵及歷史

瘋牛症是一種漸進式的致命疾病，由名為「普里昂」的變異蛋白在牛隻的神經組織中積聚因而破壞神經系統所引致。瘋牛症的潛伏期甚長，由二至八年不等。患病的動物可能性情大變（緊張或具攻擊性）、動作失調和難以站起來。動物在出現臨牀徵狀後，病情通常會在兩星期至六個月內迅速惡化，直至死亡或被宰殺。

典型瘋牛症透過牛隻進食受普里昂蛋白污染的飼料傳播給牛隻。受感染動物的某些組織（稱為高風險部位）已被證實最有可能含有並因而傳播引致瘋牛症的普里昂蛋白。根據世界動物衛生組織《陸生動物衛生法典》，這些組織包括腦部、眼睛、脊髓、頭顱骨、脊椎、扁桃腺及迴腸末端。

具傳染性的普里昂蛋白可抵受商業生產中的滅活程序（例如熱處理），並且難以被破壞或變質，這表示在廢棄動物組織轉化為穩定可用的飼料蛋白原料的處理過程中，普里昂蛋白不會被破壞。

典型瘋牛症於一九八六年在英國首次被發現，後來在其他多國陸續出現，以一九九二年錄得的個案最多，全球數目超逾37,300宗。隨着防控措施的實施，例如飼料禁令（禁用受高風險部位污染的飼料），自二零一三年以來，全球每年發生的個案已少於10宗。目前尚未有針對瘋牛症的治療方法或疫苗。

對公共衛生的關注及防控措施

瘋牛症被視為人畜共患病，因為瘋牛症與人類非典型克雅二氏症的出現有流行病學上的關係，人類食用由感染瘋牛症的牛隻所製成的受污染牛肉產品，可能會患上非典型克雅二氏症。然而，食用紅肉（即去骨的骨骼肌）及牛奶和牛奶製品被認為是安全的。

為了預防人類及動物受到感染，並制止普里昂蛋白的循環和倍增，許多國家已強制有系統地清除牛隻屠體中可能含有大量瘋牛症病原的高風險部位組織。這項措施加上禁止在飼料中使用加工動物蛋白的禁令（即禁止使用反芻動物製飼料餵飼反芻動物的禁令），已證明非常有效控制瘋牛症病原的傳播。世界動物衛生組織就牛肉及牛肉商品的國際貿易提供了全面的指引，評定瘋牛症風險級別（可忽略、可控制及未獲認可瘋牛症風險級別），並建議相應的貿易限制，以保障公眾健康和防止瘋牛症的傳播。

進口本港的牛肉必須符合《進口野味、肉類、家禽及蛋類規例》（第132AK章）的規定，牛肉必須來自符合有關杜絕和防控瘋牛症的公共衛生措施、監管實施、獸醫服務及世界動物衛生組織認可瘋牛症風險級別的要求的國家或地區。每批牛肉均須附有衛生證明書，證明符合所需條件，從而充分確保本港進口牛肉及牛肉產品的食物安全。

BSE Disease Characterisation and History

BSE is a progressive, fatal disease of the nervous system of cattle that is caused by the accumulation of an abnormal protein called “prion” in nervous tissues. BSE has a long incubation period between two and eight years. Affected animals may display changes in temperament (nervousness or aggression), incoordination and difficulty in rising. Following the onset of clinical signs, the animal’s condition deteriorates rapidly, usually in 2 weeks to 6 months, until it either dies or is destroyed.

Classical BSE is transmitted to cattle through the dietary intake of prion contaminated feed. It has been proven that certain tissues known as the specified risk materials (SRM) of infected animals, are most likely to contain and therefore transmit the BSE prion. According to the World Organisation for Animal Health (OIE) Terrestrial Animal Health Code, these tissues include brain, eyes, spinal cord, skull, vertebral column, tonsils and distal ileum.

The infectious prion is resistant to inactivation procedures such as heat treatment during commercial production and is difficult to be destroyed or denatured, which means that it may not be destroyed in the rendering process used to convert waste animal tissue to stable usable feed protein material.

Classical BSE was first detected in 1986 in the UK and further reported in many other countries. The highest number of cases worldwide was reported in 1992, with more than 37,300. With the implementation of control measures, such as feed bans (exclusion of SRM contaminated feed), there have been fewer than 10 cases annually worldwide since 2013. There is currently no treatment or vaccine against BSE.

Public Health Concerns and Control Measures

BSE is considered zoonotic due to its epidemiological link with the emergence of variant Creutzfeldt-Jakob disease (vCJD) in humans. It has been linked to the consumption of contaminated beef products derived from BSE-infected cattle. However, dietary exposure to red meat (i.e. deboned skeletal muscle) and milk and milk products is considered safe.

To prevent human and animal infection, and the recycling and amplification of prions, many countries have enforced the systematic removal of SRM tissues that might contain a significant amount of BSE infectivity from bovine carcasses. This measure, together with the ban on the use of processed animal proteins in feed (i.e. ruminant-to-ruminant feed ban), have been demonstrated to be strongly efficient in controlling exposure to BSE agents. The OIE provides comprehensive guidance on the international trade of beef and beef commodities and recognition of BSE risk status (negligible, controlled and without official BSE risk status) with corresponding trade restrictions, with a view to safeguarding public health and preventing the spread of BSE.

Beef is imported into Hong Kong in accordance with the Imported Game, Meat, Poultry and Eggs Regulation (Cap. 132AK). Beef should be imported from countries or areas that meet requirements on public health measures in eradication and control of BSE, regulatory implementations, veterinary services and OIE official BSE risk status. Each consignment is accompanied with a health certificate validating the required conditions, thereby ensuring full confidence in the food safety of imported beef and beef products in Hong Kong.



圖2: 世界動物衛生組織成員認可瘋牛症風險級別地圖 (由世界動物衛生組織提供)
Figure 2: OIE Members' official BSE risk status map (By courtesy of OIE)

罐頭食品知多少

Know More about Canned Foods

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,
Risk Communication Section, Centre for Food Safety

食物防腐的方法有很多種，全都旨在保存食物以免在收成或屠宰後變壞。罐頭是最常見的食物防腐方式之一，方便我們一年四季隨時都可以享用食物，並且易於運送。

罐頭的由來

罐頭原理的由來可追溯到十八世紀末。法國發明家阿佩爾發明了一種運用罐頭基本原理的食物防腐程序——把肉類及禽肉裝入玻璃瓶內，以軟木塞封瓶，然後置於沸水中。隨着廉價製造的金屬的出現，現今的食品罐多以鍍錫鐵及鋁製作。

罐頭的相對優點之一是保質期長，通常為一至五年。商業生產罐頭的流程包括在高壓下把食物加熱至高溫，例如攝氏121度，藉此殺死致病細菌及肉毒桿菌的孢子。罐頭會經過充分的時間加熱，以把有害病原體的孢子數目減少99.9999%以上，加熱程序通常需時最少兩至三分鐘，使產品達到「商業無菌」狀態，意即罐內食物是安全的，並且可在一般溫度下貯存。因此，罐頭食品可以方便地存放，無需冷藏。

如果罐頭凹陷或膨脹，罐內食物可以安全食用嗎？

看到凹陷或膨脹的罐頭時，消費者常見的問題是：罐內食物可以安全食用嗎？一般來說，即使罐頭有輕微的凹陷，如果凹痕較淺，並且沒有明顯的損壞跡象，食物也應該可以安全食用。如果凹陷嚴重，罐頭可能有隱藏的裂縫、破洞或封口破損，在這種情況下，不應食用罐內食物。如果罐頭生鏽，消費者亦不應食用罐內食物。

消費者還應避免食用罐身明顯膨脹的罐頭食品。如果罐頭打開時有液體湧出，可能是由於腐敗微生物透過小孔或接縫裂口進入罐內和生長，在食物中產生氣體所致。這些微生物有可能使食物變壞，不宜食用。因此，消費者不應食用罐身明顯膨脹的罐頭食品。

注意罐頭食品的鹽及糖含量

罐頭食品保存多少營養成分，視乎加工過程、產品和營養素，以及其他條件而異，有些罐頭食品可提供與新鮮及冷藏食品相若的營養成分。有人或會擔心罐頭食品是否含有防腐劑，但其實罐頭甚少添加防腐劑，因為罐頭生產過程中的熱處理步驟已足以防止食物變壞。

值得注意的是，有些罐頭食品可能加入了含有較多鹽（鈉）或糖的醬汁及調味料，以改良風味。煎炸亦可使罐頭食品（例如豆豉

Food preservation comprises a number of techniques for keeping food from spoiling after harvest or slaughter. Canning is one of the most popular methods of food preservation, which allows us to make foods readily available and easily transportable all year round.

It All Began with a Can

The principle of canning was first developed in the late 18th century. A French inventor Nicolas Appert invented a food preservation process involving the basics of canning – by packing meat and poultry in glass bottles, and corking and submerging the bottles in boiling water. With the advent of cheap milled metals, tinsplate and aluminium are now more commonly used for making food cans.

One of the advantages of canning is the long shelf life, typically ranging from one to five years. Commercial canning includes heating foods to a high temperature, e.g. 121°C, under pressure. Disease-causing bacteria and *Clostridium botulinum* spores are killed in the process. Heating is applied for a period of time long enough to accomplish an over 99.9999% reduction in the number of spores of the harmful pathogen. This usually entails heating the canned product for at least two to three minutes, rendering it 'commercially sterile', which means that the contents are safe and shelf-stable at normal storage temperatures. Therefore, canned foods can be stacked up conveniently with no refrigeration required.

Is it Safe to Eat Food from a Dented or Bulging Can?

When a consumer sees a dented or bulging can of food, a common question arises: is it safe to eat? In general, the food should be safe to consume even if the can is slightly dented, as long as the denting is shallow and there are no obvious signs of damage. If the denting is severe, the can may have a hidden split, hole or break in the seal, in which case the food within should not be consumed. If the can has rust on it, the food inside should not be eaten as well.

Consumers should also avoid eating food from a visibly bulging can. If the can spurts when it is opened, this may be a result of gas building up in the food due to the presence and growth of spoilage microbes introduced through pinholes or poor seams. These microorganisms have the potential to make the food deteriorate and unfit for consumption. Therefore, food from a can that is visibly bulging should not be consumed.

Beware of the Salt and Sugar Contents in Canned Foods

In canned foods, the nutrient retention varies depending upon the process, the product and the nutrient, among other conditions, and in some cases may offer comparable nutrition to fresh produce and their frozen counterparts. While some may concern whether preservatives are added to canned foods, preservatives are rarely added as the heat treatment of the canning process preserves the food.

It is worth noting that some canned foods might contain higher levels of salt (sodium) or sugar in the sauce and condiment for improving flavour. Frying can also make canned foods such as fried dace fish with salted black

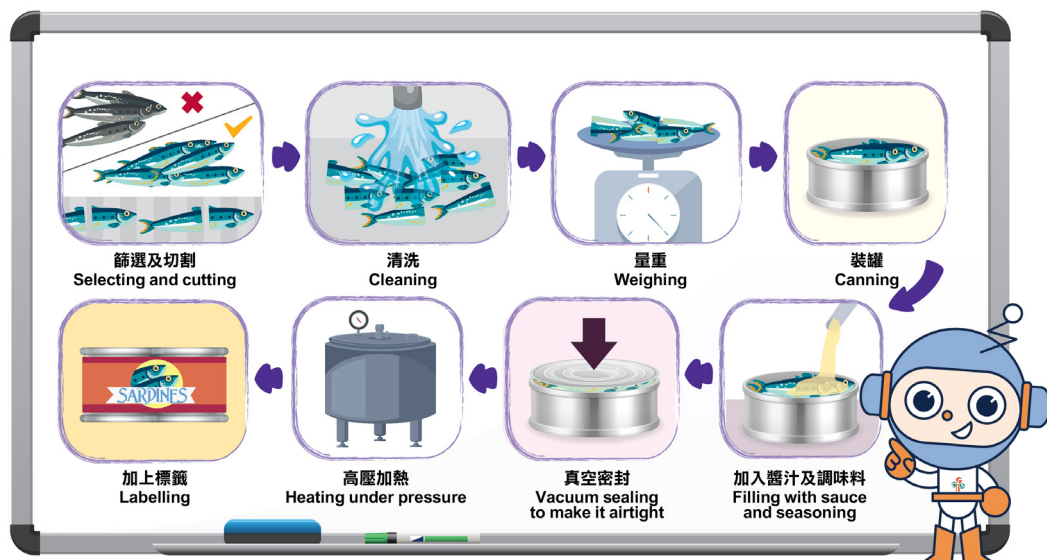


圖3: 罐頭生產流程
Figure 3: Workflow of canning

鯪魚)的脂肪含量偏高。雖然飲食中過多的糖、鈉及脂肪與非傳染病有關，但消費者可參閱罐頭食品上的營養標籤，來避免過量食用。盡可能沖洗食物，以降低其鹽及糖含量。

總括而言，在沒有新鮮食品供應時，罐頭食品可視為方便的替代品。雖然在生產過程中已去除病原體，但在購買罐頭食品時，應檢查罐頭是否有損壞跡象，並查看**食用期限**。罐頭開封後，應按照生產商所建議的位置及時間貯存。參閱營養標籤，有助更好地選擇食物，避免攝入過多的鹽及糖。

beans high in fat. While too much sugar, sodium and fat in diet is linked to non-communicable diseases, consumers can read the nutrition labels on canned foods to avoid excessive consumption. Wherever possible, rinse foods to lower their salt and sugar contents.

In conclusion, canned foods can be considered as a convenient alternative to fresh foods when they are unavailable. While pathogens are removed during the manufacturing process, look for signs of damaged cans and check the **expiry date** when purchasing canned foods. When opening a can, follow the manufacturer's recommendations for where to store it and for how long. Reading nutrition labels can help you make better food choices and avoid consuming too much salt and sugar.

咖啡：提神但傷身？ Coffee: Waking You Up with a Catch?

最近本地一項研究報告指出，**咖啡**或咖啡產品中存有各種天然物質及污染物，令人關注咖啡對健康的影響。

咖啡是廣受歡迎的飲品，由咖啡樹的種子(咖啡豆)調製而成。雖然**流行病學研究**一般認為，咖啡中的多酚有助促進健康，例如降低心血管病及二型糖尿病的風險，但由於咖啡含有**咖啡因**，只宜適量飲用，尤其是孕婦及兒童。一如許多其他農作物，咖啡豆也可能含有**霉菌毒素**(例如**赭曲霉毒素A**)及在烘焙過程中形成的污染物(例如**丙烯酰胺**)。

本港市民從膳食攝入的**赭曲霉毒素A**總量偏低，最高僅佔健康參考值的9.2%，對健康並無影響。至於本港成年人從咖啡攝入的**丙烯酰胺**分量佔總膳食攝入量的百分比，亦屬微不足道。然而，市民應保持均衡及多元化的飲食，以減低因偏吃而攝入某些污染物的風險。

There was a recent local study which reports the existence of various natural substances and contaminants in **coffee** or coffee products, raising some health concerns.

A popular drink, coffee is prepared from the seeds (beans) of coffee plants. While the polyphenols in coffee are generally presumed to contribute to health benefits like reduced risks of cardiovascular diseases and type 2 diabetes based on **epidemiological studies**, coffee should be consumed in moderation, especially for pregnant women and children due to **caffeine**. As in many other agricultural products, coffee beans may also contain **mould toxins** like **ochratoxin A** and process contaminants formed during roasting such as **acrylamide**.

The overall dietary exposure to **ochratoxin A** in Hong Kong is relatively low at up to 9.2% of the health-based guidance value and of no health concern to the local population. The contribution of coffee to the overall dietary **acrylamide intake** of local adults is also insignificant. However, members of the public are advised to maintain a balanced and varied diet to minimise the risk from exposure to contaminants from a limited range of food items.

六溴環十二烷與食物安全 Hexabromocyclododecanes and Food Safety

六溴環十二烷是阻燃劑，主要用於紡織品、建築及包裝物料。由於屬**持久性有機污染物**，六溴環十二烷有可能沿着食物鏈在生物體內累積。雖然六溴環十二烷引致急性中毒的機會不大，但其長期毒性大多影響到實驗中動物的肝臟及體內甲狀腺激素的平衡。

食物安全中心進行的一項**風險評估研究**顯示，海魚、蛋和蛋類製品、軟體類動物，以及淡水魚的六溴環十二烷含量相對較高。研究結果指出，目前本港成年人從膳食攝入的六溴環十二烷分量不會引起健康問題。與其他國家的研究相比，這項研究發現，本港市民的六溴環十二烷膳食攝入量相對較低。市民應保持均衡及多元化的飲食，包括進食各類蔬果。

Hexabromocyclododecanes (HBCDD) are flame retardants primarily used in textiles, construction and packing materials. They are **persistent organic pollutants** and have a potential to bioaccumulate along food chains. While the acute toxicity of HBCDD is modest, the long-term toxicity of HBCDD in experimental animals mostly affects the liver and thyroid hormone homeostasis.

The Centre for Food Safety has conducted a **risk assessment study** which reveals that seawater fish, eggs and egg products, molluscs and freshwater fish contain relatively higher levels of HBCDD. The findings show that the current dietary exposure to HBCDD of the Hong Kong adult population does not raise a health concern. The dietary exposure to HBCDD found in this study is comparatively low when compared to studies from other countries. The general public is encouraged to maintain a well-balanced and diverse diet that includes a wide variety of fruits and vegetables.



風險傳達工作一覽 (二零二一年十二月)

Summary of Risk Communication Work (December 2021)

事故/食物安全個案
Incidents/ Food Safety
Cases:
228

公眾查詢
Public Enquiries:
65

業界查詢
Trade Enquiries:
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