

Background

Century egg is also known as preserved egg, hundred-year egg, thousand-year egg, thousand-year-old egg, and millennium egg. In Mandarin, it is also known as *Pidan*.

It is a Chinese cuisine ingredient made by preserving duck, chicken or quail eggs in a mixture of clay, ash, salt, lime, and rice hulls for several weeks to several months, depending on the method of processing. Through the process, the yolk becomes a dark green, cream-like substance with a strong odor of sulphur and ammonia, while the white becomes a dark brown, transparent jelly with little flavor.

Salted duck egg is a Chinese preserved food product made by soaking duck eggs in brine, or packing each egg in damp salted charcoal. In Asian supermarkets, these eggs are sometimes sold covered in a thick layer of salted charcoal paste. The eggs may also be sold with the salted paste removed, wrapped in plastic, and vacuum packed. From the salt curing process, the salted duck eggs have a briny aroma, a very liquid egg white and a yolk that is bright orange-red in colour, round, and firm in texture.

Salted duck eggs are normally boiled or steamed before being peeled and eaten as a condiment to congee or cooked with other foods as flavoring. The egg white has a sharp, salty taste. The orange red yolk is rich, fatty, and less salty. The yolk is prized and is used in Chinese moon-cakes to symbolize the moon.

Safety issue with Century Egg and Salted egg.

Century and salted eggs are best sold when the eggs yolks are red or orange in colour. The problem happens is when some of the farmers add colours or dye to the feed so that the ducks and chicken eggs produced are red or orange in colour and darker so that this can attract consumers to buy them.

One of the dye feared to be used in chicken and duck feed are Sudan Red Dyes. Sudan Red I,II,III and,IV is not allowed in most countries because it is a suspected carcinogen (cancer-causing). It is also banned in Malaysia.

At a Asian Network for Consumer Participation in Standardization workshop earlier this year in Malaysia, participants shared that use of Sudan Red Dyes in salted egg and curry powder and chilly sauce; illegally is prevalent.

Malaysian Association of Standards Users decided to include salted egg as one of the products to be tested this year.

There have been many cases reported by foreign media on the illegal use of Sudan Red and about the dangers of Sudan Red Dye and its contamination in foods like eggs, red chili, curry powder and sauces.

On November 20, 2006 the Xinhua News Agency reported that red-yolk duck eggs containing the carcinogenic red dye Sudan Red IV have been found in some provinces and cities including Beijing. The eggs have been produced by Sanhu Eggs Co. Ltd based in China's Jiangsu Province. The officials have also reported that the cancer-causing dye could be used wider than anticipated.

The dye has also been detected in over 6,000 chicken eggs on sale in two Metro and Carrefour supermarkets in Southeast China's Fujian Province. The provincial administration of quality supervision said the harmful substance was as high as 0.3 milligrams per kilogram (or 0.3ppm).

In June 2003, France alerted the European Commission, EU on Sudan Red Dye in chilli powders. From then on, chilli and chilli products including curry powder can only be imported into the EU if they are accompanied by an analytical report which shows that they do not contain Sudan I, Sudan II, Sudan III or Scarlet Red (Sudan IV) - classified as carcinogens by the International Agency for Research on Cancer.

In May of 2003, the European Authority reported Sudan I in ground capsicums produced in India. Levels of 4,000 ppm Sudan I were identified in products from two Mumbai based shippers!

In the United Kingdom, UK a screening method to identify a series of banned food dyes has been developed. In the UK alone, the food industry has recalled for destruction more than 160 products ranging from pesto sauce to chicken tikka masala from the supermarket shelves since July 2003.

New Zealand Food Safety Authority (NZFSA) has put in place a monitoring programme for Sudan Dyes. The initial test of 43 chilli powders and products containing chilli powder imported into New Zealand showed that only one had measurable levels of the contaminant. As a result, the importer voluntarily withdrew the product from sale. This product had been imported via Australia, and not directly from India. Australian authorities have also been alerted. (Source: New Zealand Food Safety Authority, **UK food recall - New Zealand updated** 21 February 2005)

Methodology and Approach

1. The sample eggs were identified based on the common brands available in most of hypermarkets and grocery shops.
2. Once a brand was identified, 8 pieces of eggs were purchased due to the sampling requirement by the laboratories.
3. The eggs were purchased from locations in Ampang and Kuala Lumpur.



The following are the descriptions of the eggs purchased for testing:

LIST OF PRODUCT	BARCODE & EXPIRY DATE	PLACE OR PURCHASE /DISTRIBUTORS/ MANUFACTURERS	QUANTITY	PARAMETER TO BE TESTED
Century Egg	9555062507321 (30.4.2011)	[REDACTED]	8	Sudan I,II,III,IV
Salted Egg	2110079505521 (17.08.2011)	[REDACTED]	8	Sudan I,II,III,IV
Salted Egg	9554100125503 (20.09.2010)	[REDACTED]	8	Sudan I,II,III,IV

LIST OF PRODUCT	BARCODE & EXPIRY DATE	PLACE OR PURCHASE /DISTRIBUTORS/ MANUFACTURERS	QUANTITY	PARAMETER TO BE TESTED
Salted Egg	9555062503118 (23.10.10)	[REDACTED]	8	Sudan I,II,III,IV

4. The eggs were tested according to the In House Method QWI-OF/17-22 Based on FSA (UK) (Method 145 B)

[REDACTED]	Sudan Red I,II,III and IV	In House Method QWI-OF/17-22 Based on FSA (UK) (Method 145B)
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Limitations of the study:

1. Accurate sampling methods were not applied to represent the entire samples in the market.
2. Eggs selected picked from the counters. Purchased was based on the rationale that the common brands could be found in most of the shopping complexes, hypermarkets and shops.
3. Only duck salted egg and duck century egg. Chicken eggs were not included due to budget constraint.

Dangers of Sudan Dye

The red dyes Sudan I, II, III and IV are oil soluble, azo dyes used legally in the leather and fabric industries. They are fairly inexpensive and readily available. However, they are not approved at any level for use in foods. The International Agency for Research on Cancer (IARC), a part of the World Health Organization, has assessed the Sudan dyes as Group 3 geno-toxic carcinogens. (source: New Zealand Food Safety Authority, **UK food recall - New Zealand updated** 21 February 2005)

Sudan I has been used as a food coloring in several countries but it has been classified as unsafe, because it is known to cause tumors in the liver or urinary bladder in rats, mice, and rabbits. It is therefore a possible carcinogen and mutagen for humans.

However it is widely used to color materials such as hydrocarbon solvents, oils, fats, waxes, plastics, printing inks, and shoe and floor polishes. Moreover, Sudan I is an important compound, not because it is still widely used, but because it is the simplest in a series of dyes and pigments that are used in very great quantities and occur everywhere in red- and-orange colored consumer products, foods, and printed matter. Such a wide use of these azo dyes could result in a considerable exposure.

Patogenesis of Sudan Dye in human body

Although Sudan dyes are indirect carcinogens, they generate metabolites that are converted to several active mutagens and carcinogens in humans such as aniline or 1-amido-2-naphthol, which can be metabolized by hepatic microsomes into benzene and naphthol. These end products can then combine with DNA and RNA to destroy cells.

Regulation in Malaysia

Sudan I, II, III and IV, as well as Sudan Red G, are not permitted to be added as the colouring substance in food under the Food Regulations 1985. However, Sudan 1, may be formed as an impurity during the production of Sunset Yellow FCF. Sunset Yellow FCF is a permitted colouring substance under the Food Regulations 1985.

By referring to the full specification on Sunset Yellow FCF prepared at the 69th JECFA in 2008, the permitted level for Sudan I (1-(Phenylazo)-2-naphthalenol) is not more than 1 mg/kg or 1ppm. Thus, the presence of Sudan 1 in Sunset Yellow FCF is permitted with a condition not more than this level. In all other aspects, the provisions of the Food Act 1983 and Food Regulations 1985 shall be complied with.

The Joint FAO/WHO Expert Committee on Food Additives (JECFA) is an international scientific expert committee that is administered jointly by the Food and Agriculture Organization (FAO) of the United Nations and the World Health Organization (WHO). It has been meeting since 1956, initially to evaluate the safety of food additives. Its work now, also includes the evaluation of contaminants, naturally occurring toxicants and residues of veterinary drugs in food.

At the moment the Malaysian Food Act 1983 and Food Regulations 1985 does not have a special clause or specification on the limitation of Sudan Red (Based on information received from MOH). However, there is a general clause to cover hazardous substances which will be scrutinized by the ministry from time to time

Findings

Below are the test reports from [REDACTED]

[REDACTED]

Sample description: One sample
 Product Name: Salted Egg
 Barcode & Expiry Date: 9555062503118 (Expiry :23rd October 2010)
 Distributor/Manufacturers: Manufacturer: [REDACTED]

Analysis results of sample:

Test Parameters	Units	Results	Exceeding Limit (%)	Method References
Sudan I	mg/kg	(1.8)	80%	In House Method QWI- OF/17- 22 Based on FSA (UK) (Method 145B)
Sudan II	mg/kg	ND (< 1)		
Sudan III	mg/kg	ND (< 1)		
Sudan IV	mg/kg	ND (< 1)		

ND: Not detected



Below are the test reports from [REDACTED]

[REDACTED]

Sample description: One sample
 Product Name: Century Egg
 Barcode & Expiry Date: 9555062507321 (Expiry :30th April 2011)
 Distributor/Manufacturers: Manufacturer: [REDACTED]

Test Parameters	Units	Results	Exceeding Limit (%)	Method References
Sudan I	mg/kg	(3.1)	210 %	In House Method QWI-OF/17-22 Based on FSA (UK) (Method 145B)
Sudan II	mg/kg	ND (< 1)		
Sudan III	mg/kg	ND (< 1)		
Sudan IV	mg/kg	ND (< 1)		

Analysis results of sample:

ND: Not detected



Below are the test reports from [REDACTED]

[REDACTED]

Sample description: One sample
Product Name: Salted Egg
Barcode & Expiry Date: 9554100125503 (Expiry :20th September 2010)
Distributor/Manufacturers: Manufacturer: [REDACTED]

Analysis results of sample:

Test Parameters	Units	Results	Exceeding Limit (%)	Method References
Sudan I	mg/kg	(1.3)	30%	In House Method QWI-OF/17-22 Based on FSA (UK) (Method 145B)
Sudan II	mg/kg	ND (< 1)		
Sudan III	mg/kg	ND (< 1)		
Sudan IV	mg/kg	ND (< 1)		

ND: Not detected



Below are the test reports from [REDACTED]

[REDACTED]

Sample description: One sample
Product Name: Salted Egg
Barcode & Expiry Date: 2110079505521 (Expiry :17th August 2011)
Distributor/Manufacturers: Manufacturer: [REDACTED]
[REDACTED]

Analysis results of sample:

Test Parameters	Units	Results	Method References
Sudan I	mg/kg	ND (< 1)	In House Method QWI-OF/17-22 Based on FSA (UK) (Method 145B)
Sudan II	mg/kg	ND (< 1)	
Sudan III	mg/kg	ND (< 1)	
Sudan IV	mg/kg	ND (< 1)	

ND: Not detected



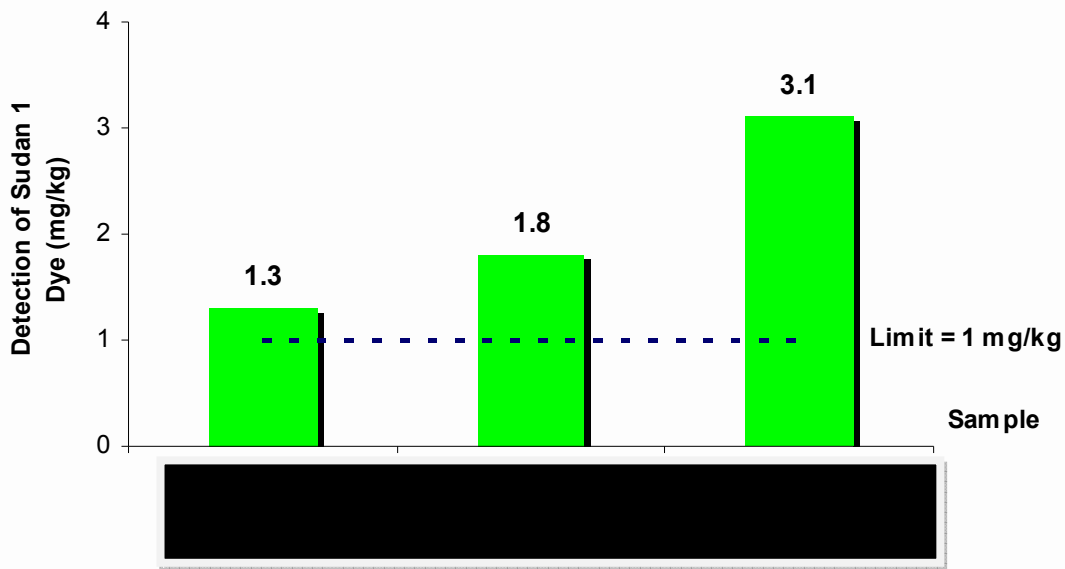
Discussion, Conclusion and Recommendations

Sudan Red Dye is known as carcinogen and it is not permitted in most of the countries for use in food. The Malaysian Food Act 1983 and Food Regulations 1985 as mentioned earlier do not have a specific clause to limit the presence of Sudan Red Dye but it is covered in a more general clause.

This could be a reason why local manufacturers may not be aware that Sudan Red Dye is prohibited in production of century and salted eggs.

The Malaysian Association of Standards Users was informed by the Ministry of Health that at the moment they refer to JECFA specifications where the limit of Sudan Red Dye should not exceed 1mg/kg or 1 parts per million (1ppm).

Results of Testing of Salted and Century Duck Egg for Sudan 1 Dye - 2010



Based on the test report by [REDACTED], out of 4 samples, 3 samples contain detectable level of Sudan I dye in the eggs.

The samples exceeded the 1 ppm limit by **30%**, **80%** and **210%** respectively. This is causes real health and safety concern.

Standards Users would like to urge the Ministry of Health Malaysia to revise the existing regulation to include safety clauses specifically on this dangerous carcinogenic dye in all consumer food products.

There is still lack of awareness and understanding among the manufacturers on the regulation and due to difficulty in understanding grey areas that exist in the regulation. We also urge both the Ministry of Health and Ministry of Agriculture and Agro-Based

Industries to provide clearer guidelines on food products which are prepared in the farm and delivered to consumers (via retailers etc.) such as eggs and milk.

Standards Users failed was unable to access information from the relevant department within the Ministry of Agriculture and Agro-Based Industries on control of safety for eggs supplied directly from the farm to retailers.

Standards Users will also issue a New Work Item Proposal to the Department of Standards Malaysia (STANDARDS MALAYSIA) for:

1. Salted Eggs and Century Eggs (duck, chicken and quail) which is intended to be specifications.
2. Test method to determine level of Sudan dyes in food.

Based on the background study that we have done, we have noted that there are also other consumer products that have been detected for Sudan Red Dye in other countries. Due to our limitation, we were not able to test these products.

The products suspected to contain Sudan Red Dye are:

1. Pesto sauce
2. Chicken tikka masala powder
3. Capsicum powder
4. Chilli powder
5. Unrefined palm oils
6. Seasoning products
7. Tumeric
8. Saffron
9. Salted Quail bird egg

As a precautionary measure, we urge both Ministry of Health and Ministry of Agriculture and Agro-Based Industries to carry out market surveillance and test salted / century eggs and other products (listed above) which have tendencies to be tampered with Sudan Dye.

References:

1. *Sudan I Is a Potential Carcinogen for Humans: Evidence for Its Metabolic Activation and Detoxication by Human Recombinant Cytochrome P450 1A1 and Liver Microsomes 1* -Marie Stiborova', 2 Va'clav Marti'nek, Helena Ry'dlova', Petr Hodek, and Eva Frei ,Department of Biochemistry, Faculty of Science, Charles University, 128 40 Prague 2, The Czech Republic [M. S., V. M., H. R., P. H.], and Division of Molecular Toxicology,
2. *Article: Binding of Sudan II and IV to lecithin liposomes and E. coli membranes: insights into the toxicity of hydrophobic azo dyes.* (Research article)(Report) -By Li, Lu; Gao, Hong-Wen; Ren, Jiao-Rong; Chen, Ling; Li, Yu-Cheng; Zhao, Jian-Fu; Zhao, He-Ping; Yuan, Yuan
3. Sudan Dyes in Foods- A technical presentation in DIFSC 2010 by Dr. Alamuri Gopala Krishnamacharyulu, Principal Food Analyst, Food Chemical Analysis unit Food & Environment laboratory, Dubai Central Laboratory, DUBAI (U.A.E)
4. (Xinhua News Agency November 20, 2006)
5. *China bans duck eggs suspected of containing harmful dye*-The Press Trust of India Ltd.- November 13, 2006
6. www.foodqualitynews.com Sudan red colouring fine a warning to food industry- Anthony Fletcher, 24-Feb-2006
7. www.foodqualitynews.com-Sudan 1 recall spreads to China
8. www.foodqualitynews.com-Harmful, illegal colour in UK food products
9. www.foodqualitynews.com-FSA colour warning
10. www.nzfsa.govt.nz
11. www.china.org.cn-Fresh Duck Eggs Found to Contain Sudan Red in Fujian
12. www.foodqualitynews.com-Europe on the alert for carcinogenic colours
13. www.cfs.gov.hk
14. <http://www.who.int/ipcs/food/jecfa/about/en/index>.
15. http://en.wikipedia.org/wiki/Century_egg
16. http://en.wikipedia.org/wiki/Sudan_Red_G