

Food Safety Governance: Standard Operating Procedure on Controlling of Nitrite Level, Handling and Processing of Edible Bird's Nest

¹Noriah Ramli and ²Saiful Mohammad Nizam Azmi

¹Assistant Professor, Ahmad Ibrahim Kulliyah of Laws, International Islamic University Malaysia, Malaysia

²International Institute for Halal Research and Training (INHART), International Islamic University Malaysia

Abstract: Malaysia is one of the largest bird's nest exporters particularly to China and Hong Kong market. However, Malaysia multimillion ringgits bird's nest industry has been hit hard by China's ban and a series of scandals, with a drop in sales and prices. In light of the emerging food safety issues that surrounds the Malaysian Edible Bird's Nest (EBN) industry, which have somewhat affect the economic gain of the EBN exporters in Malaysia, the Ministry of Health Malaysia, the Ministry of Agriculture and Agro-based and Industry Malaysia under its Department of Veterinary Services (DVS) and Department of Standards Malaysia had since 2003 issued a set of guidelines for a more systematic management of the local swift's nest industry. Besides, these guidelines are needed to ensure that the local swiftlet's industry does not create any health problem to the population.

Key words: Edible bird's nest, Malaysian Standard, food safety, good animal husbandry practices.

INTRODUCTION

Globalization and free trade have opened up world food market among countries at different stages of development. With continuously expanding food industry system, food recalls and the discovery of emerging food borne pathogens are becoming more frequent occurrences and the question of food safety comes to the forefront of foreign trade and public health. Therefore, a harmonized international food safety system is very important for countries to build capacity and address food safety problems from a global perspective (Pan et al., 2010). The World Health Organization (WHO) concluded that an illness due to contamination food is perhaps the most widespread health problem in the contemporary world and an important cause of reduced economic productivity. Agriculture Organization of the United Nations (FAO) defines food security as "a state of affairs when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (Imai, 2004).

Malaysia multimillion ringgits bird's nest industry has been hit hard by China's ban and a series of scandals. The demand for EBN has dropped to between 20% and 30%, while prices have fallen by 20%. According to one of the Bird's Nest Association president, the selling price of bird's nest has dropped from RM 4,500 to RM 4,800 per kilogramme to RM 3,800 to RM 4,000 per kilogramme. The industry suffered its first blow when China banned Malaysian bird's nest in July 2011 after it was found to contain nitrite (a common food preservative which is carcinogenic if consumed beyond safety levels). Under the Malaysia Food Regulations 1985, the accepted level of nitrite in bird's nest in Malaysia is 30 parts per million (ppm), however China has imposed a total ban on nitrite in bird's nest, which almost impossible to achieve. The Ministry of Health Malaysia had taken the initiative to produce the guideline to ensure food safety and quality, and to control the nitrite level in EBN from Malaysia. A "Standard Operating Procedure on the Control of Nitrite Level" was produced effectively on March 12th, 2012. In addition to this, several other Malaysian Standards governing the practice of handling and processing of EBN were also introduced. They were "Good Animal Husbandry Practice-Edible-Birdnest Swiftlet Ranching and Its Premises (MS 2273:2010)", "Good Manufacturing Practice (GMP) for Processing Raw-Unclean and Raw-Clean Edible-Birdnest (EBN) (MS 2333:2010)", and "Edible-Birdnest (EBN)-Specification (MS 2334:2011)".

This paper aims to highlights certain important aspects of Malaysian Food Act 1983 and the salient features of the guidelines governing the control of nitrite level in EBN as well as handling and processing of EBN from the Malaysian perspective.

Literature Review:

Edible Bird's Nest (EBN):

The EBN, which was derived from swiftlet's saliva, has been a renowned heritage delicacy for many generations since the early Chinese dynasties. The major ingredients of EBN are glycoproteins, whereas the

Corresponding Author: Noriah Ramli, Assistant Professor, Ahmad Ibrahim Kulliyah of Laws, International Islamic University Malaysia, Malaysia
E-mail: noriahr@iium.edu.my

major component of carbohydrate in EBN is sialic acid by 9% (Colombo et al., 2003). Other carbohydrate components include N-acetylgalactosamine (galNac) (7.2%), N-acetylglucosamine (glcNac) (5.3%), galactose (16.9%) and fructose (0.7%) (Dhawan and Kuhad, 2002).

Amino acids and mineral salts are also found in the EBN, mainly sodium and calcium, with low levels of magnesium, zinc, manganese and iron (Sam et al., 1991). Kathan and Weeks (1969) have found three nonessential amino acids (aspartic acid, glutamic acid and proline) and two essential amino acids (threonine and valine) in EBN. They play an important role in facilitating normal body function such as repairing and providing immunity (Kathan and Weeks, 1969).

Medicinal Values of EBN:

Although EBN has a long history as therapeutic herbal medicine and highly acclaimed for its beauty-rejuvenating applications, very limited research has been done to scientifically prove its medicinal properties. Ancient Chinese literatures described EBN as a precious food because of its unique medicinal property in treating tuberculosis, gastric ulcers and bleeding in the lungs. Greater discoveries on EBN were elucidated by modern science among which was the discovery of the first known avian epidermal growth factor found in purified swiftlet nest extracts (Kong et al., 1987; Ng et al., 1986). Avian epidermal growth factor, which is a hormone-like substance could stimulate cell division and enhance cell regeneration (Zainal Abidin et al., 2011). Zainal Abidin et al. (2010) had evaluated the potential value of EBN in promoting corneal cell growth and proliferation that are essential during wound healing, particularly in corneal keratocytes. The results suggested that at low concentration, EBN could synergistically induce cell proliferation especially in serum-containing medium, subsequently a novel breakthrough towards corneal wound healing.

EBN was also found to have mitogenic effects on human peripheral blood monocytes following stimulation with Concanavalin A and Phytohemagglutinin A (Yano et al., 2003). Using EBN and a formulation containing pearl powder, it was shown there was an elevation of DNA synthesis of the T-lymphocytes and circulating immunoglobulin M level in mice, implying the immunoenhancing effects (Zhang et al., 1994). Guo et al. (2006) had found out that EBN was able to prevent influenza viruses *in vitro* via its sialic acid component.

Most recently, a study on the effect of EBN on intestinal cells using Caco-2 cell line showed the highest proliferation in commercial EBN compared to the unprocessed EBN obtained from four different zones of Peninsular Malaysia. These findings suggested the presence of growth stimulating components in the commercial EBN, which could either be naturally present or because of adulteration (Aswir and Wan Nazaimoon, 2010).

RESULTS AND DISCUSSION

Food under the Malaysian Food Act 1983:

Under the Malaysian Food Act 1983 the term "food" includes every article manufactured, sold or represented for use as food or drink for human consumption or which enters into or is used in the composition, preparation, preservation, of any food or drink and includes confectionery, chewing substances and any ingredient of such food, drink, confectionery or chewing substances.

Food Injurious to Health:

Section 13(1) of the Food Act 1983 prohibits any person who prepares or sells any food that has in or upon it any substance which is poisonous, harmful or otherwise injurious to health. Upon conviction of such offence shall be liable to a fine not exceeding one hundred thousand ringgits (RM 1000, 000) or to imprisonment for a term not exceeding ten (10) years or to both.

Adulterated Food:

Section 13B of the Food Act 1983 on the other hand prohibits the selling and preparing adulterated food. This section also provides that addition of any substance to any food item is totally not allowed and prohibited. For the purpose of food safety and quality, this section specifies what amounts to adulterated food. A food is deemed to be adulterated if:

- (a) it contains or is mixed or diluted with any substance which diminishes in any manner its nutritive or other beneficial properties as compared with such food in a pure, normal or specified state and in an undeteriorated and sound condition, or which in any other manner operates or may operate to the prejudice or disadvantage of the purchaser or consumer;
- (b) any substance or ingredient has been extracted, wholly or in part, or omitted, from the food and by reason of such extraction or omission, the nutritive or other beneficial properties of the food are less than those of the food in its specified state, or the food operates or may operate to the prejudice or disadvantage of the purchaser or consumer;

- (c) it contains or is mixed or diluted with any substance of lower commercial value than such food in a pure, normal or specified state and in an undeteriorated and sound condition;
- (d) it contains any substance the addition of which is not permitted by this Act or any regulations made under this Act;
- (e) it does not comply with the standard or specification prescribed by any regulations made under this Act;
- (f) it contains a greater proportion of any substance than is permitted by this Act or any regulations made under this Act;
- (g) it is mixed, coloured, powdered, coated, stained, prepared or otherwise treated in a manner whereby damage or inferiority may be concealed; or
- (h) it is in a package, and the contents of the package as originally packed have been removed in whole or in part and other contents have been placed in the package.

The Standard Operating Procedure (SOP):

In a study conducted by the Ministry of Health (MOH) on the level of nitrite contamination in EBN it was revealed that the natural occurrence of nitrite was due to several contributing factors such as natural presence of nitrite in the bird's saliva, formation of ammonia in the bird's nest, presence of ammonia from the bird's dropping, the natural cave's environment which finally converted to nitrite.

Ironically, it was also identified that adequate soaking and washing prior to consumption significantly reduce the level of nitrite in EBN as nitrite is highly soluble in water. Among others, the SOP identified several control points (CP) which requires the special attention, observation and close monitoring which ultimately able to reduce the level of nitrite contamination in EBN. Generally, there are four critical areas which start from the bird's house, transportation, processing establishment, softening and cleaning.

Bird's House:

At the bird's house control point (CP) and for the purpose of Good Animal Husbandry Practice (GAHP) it is required that producer to always maintain adequate hygiene requirements such as to keep the bird's house clean at all times, to use clean water for washing purposes, to prevent contamination by other types of animals and very importantly to keep proper cleaning record.

Transportation:

For the use of transportation or vehicles producers are advice to comply with terms and conditions specify by the Food Safety Regulations 2009 (Malaysia), which among others to minimise the chances of cross-contamination during handling and transporting the goods, apart from providing safe and clean transporting environment.

Processing Establishment:

At the processing establishment producers are required to comply with the Food Safety Regulations 2009, which emphasise strictly on personal hygiene and food hygiene requirements. For the purpose of softening and cleaning, it is required that the processing establishment to have adequate supply of clean water.

Sampling/Analysis:

Finally, for purpose of product safety and to ensure the food is safe for human consumption, a sample should be sent for testing of nitrite in EBN and a proper record shall be kept by the producer or company. Department of Veterinary Services Malaysia will issue a "Veterinary Health Certificate" to the company producing or manufacturing EBN if all the necessary requirements are carefully fulfilled. A sample of the certificate awarded is shown in figure 1.

Good Animal Husbandry Practice-Edible-Birdnest Swiftlet Ranching and Its Premises (MS 2273:2010):

This Malaysian Standard (MS) prescribes the requirements in ranching practices of edible-birdnest swiftlet. It includes the establishment of Good Animal Husbandry Practice for continuous improvement and sustainable production of its produce, whilst ensuring health, safety and comforts to both the operators and the birds, with no degradation to environment. In terms of food safety requirements, this standard emphasize on the hygiene requirements for the edible-birdnest swiftlet premises, cleaning materials, washing facilities, pest control, isolation and treatment of sick or injured bird.

In light of the *Declaration of Notifiable Diseases (2009)* it is required for the breeder to report to the relevant agency any avian diseases that may affect the birds concerned. These include highly pathogenic avian influenza, Newcastle disease, Avian tuberculosis, avian infectious bronchitis, etc. This standard was formulated and to be used together *Animal Act 1953 (Revised 2006)*, *Declaration of Notifiable Diseases 2009*, *Feed Act 2009*, *International Air Transport Association (IATA)*, *Life Animals Regulations 2005*, *Convention on*

International Trade in Endangered Species of Wild Fauna and Flora (CITES), Protection of Wildlife (Amendment) Order 2003 and Veterinary Surgeon Act 1974.



Fig. 1: Sample of “Veterinary Health Certificate” issued by Department of Veterinary Services Malaysia for Edible Bird’s Nest (EBN).

Good Manufacturing Practice (GMP) for Processing Raw-Unclean and Raw-Clean Edible-Birdnest (EBN) (MS 2333:2010):

This Malaysian Standard (MS) provides a guideline for the EBN processors to produce a quality and safe EBN for human consumption. It covers specification of house-raw-unclean EBN during sorting, grading and packaging of raw-unclean EBN. Secondly it also provides the specification for packaging of quality and safe raw-clean EBN. Raw-clean EBN from receiving of raw-unclean EBN which includes sorting, soaking, picking, removal of impurities, molding, drying, grading and packaging of quality and safe raw-clean EBN.

This standard was formulated and to be used together with *MS 1514, Good Manufacturing Practice (GMP) for Food, MS 2273 (P), Good Animal Husbandry Practice-Edible-Birdnest Swiftlet ranching and its premises, Malaysian Food Act 1983 (Act 281) and Food Regulations 1985, Malaysian Food Hygiene Regulations 2009 and Pesticides Act 1974.*

Edible-Birdnest (EBN)-Specification (MS 2334:2011):

This standard prescribes the requirements for the grading of raw-unclean EBN and raw-clean EBN. Generally it covers the specification for grading, packaging, labeling which has to be done in accordance with the provisions of Malaysian Food Act 1983 and Food Regulations 1985, premises requirements, personal hygiene, certification mark and the legal requirements.

This standard was formulated and to be used together with *MS 1514, Good Manufacturing Practice (GMP) for Food, MS 2273 (P), Good Animal Husbandry Practice-Edible-birdnest swiftlet ranching and its premises, Malaysian Food Act 1983 (Act 281) and Food Regulations 1985, Malaysian Food Hygiene Regulations 2009.*

ACKNOWLEDGMENT

The authors are grateful to the International Institute for Halal Research and Training (INHART), IIUM for providing necessary facilities for the present study.

REFERENCES

- Aswir, A.R., W.M. Wan Nazaimoon, 2010. Effects of edible bird's nest on Caco-2 cell proliferation. *Journal of Food Technology*, 3: 126-130.
- Colombo, J.P., C. Garcia-Rodenas, P.R. Guesry, J. Rey, 2003. Potential effects of supplementation with amino acids, choline or sialic acid on cognitive development in young infants. *Acta Paediatrica*, 92: 42-46.
- Dhawan, S., R.C. Kuhad, 2002. Effect of amino acids and vitamins on laccase production by the bird's nest fungus. *Cyathus bulleri Bioresour Technol.*, 84: 35-38.
- Food Act 1983 (Malaysia).
- Food Regulations 1985 (Malaysia).
- Food Safety Regulations 2009.
- Guo, C., T. Takahashi, W. Bukawa, N. Takahashi, H. Yagi, K. Kato, K.I.P.J. Hidari, D. Miyamoto, T. Suzuki, Y. Suzuki, 2006. Edible bird's nest extract inhibits influenza virus infection. *Antiviral Research*, 70: 140-146.
- Imai, 2004. Special Programme for Food Security. Retrieved November 13th, 2012.
- Kathan, R.I.I., D.I. Weeks, 1969. Structure studies of collocalia mucoid. I. Carbohydrate and amino acid composition. *Arch Biochem Biophys*, 134: 572-576.
- Kong, Y.C., W.M. Keung, T.T. Tip, K.K. Ko, S.W. Tsao, M.H. Ng, 1987. Evidence that epidermal growth factor is present in Swiftlet's (*Collocalia*) nest. *Comparative Biochemistry and Physiology*, 87(2): 221-226.
- MS 2273:2010, 2010. Good animal husbandry practice-edible-birdnest swiftlet ranching and its premises. Department of Standards Malaysia.
- MS 2333:2010, 2010. Good Manufacturing Practice (GMP) for Processing Raw-Unclean and Raw-Clean Edible-Birdnest (EBN). Department of Standards Malaysia.
- MS2334:2011, 2011. Edible-Birdnest (EBN)-Specification. Department of Standards Malaysia.
- Ng, M.H., K.H. Chan, Y.C. Kong, 1986. Potentiation of mitogenicity response by extracts of Swiftlet's (*Collocalia*) nest. *Biochem Int.*, 13: 521-531.
- Sam, C.T., P.H. Tan, C.H. Lim, 1991. Establishing the authenticity of edible bird's nest. *ISFM Medicine Scientific Review*, 3: 1-4.
- Yano, S., K. Kondo, M. Yamaguchi, G. Richmond, M. Hutchison, A. Wakeling, S. Averbuch, P. Wadsworth, 2003. Distribution and function of EGFR in human tissue and the effect of EGFR tyrosine kinase inhibition. *Anticancer Research*, 23: 3639-3650.
- Zainal Abidin, F., K.H. Chua, S.L. Ng, E.S. Mohd Ramli, T.H. Lee, N. Abd Ghafar, 2011. Effects of edible bird's nest (EBN) on cultured rabbit corneal keratocytes. *BMC Complementary and Alternative Medicine*, 11: 94.
- Zhang, M., D. Wang, J. Wang, 1994. The effects of the Zhenzhu-Yanwo extracts on animal function. *Pharm Biotech*, 1: 49-51.