

Institution of Prosecution against the Act of Transporting In a Vehicle a Bulk Consignment of Poultry Meat Unfit for Human Consumption – General Interest

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Abstract—Storage temperature plays a major role in causing changes in quality and safety of poultry meat. Product should retain its desired sensory, chemical, physical, functional and microbiological characteristics. Authorized Officers are expected to guide and inspect on food safety and security measures of the country. After conducting comprehensive food outlet inspections covering the whole Medical Officer Health (MOH) area and legal prosecutions over violation of law related to food safety, inspections of food transporting vehicles were conducted. Twenty vehicles were inspected and 7 out of them were released after giving strict advice, 3 were detained to produce before courts. By entering a plea of guilty, first two defendants were admitting their guilt and fined 67 USD each. Last case was charged against the chicken company transporting chicken at temperature of +5^o Centigrade (standard -18^o Centigrade), where company lawyer admitted a plea of guilt, but pleaded to release all chicken worth of 2700 USD. Usually in Sri Lankan context, temperature of container was measuring by thermometers as a spot reading of whole passage of cold chain of frozen foods. Upon the expert opinion and scientific explaining by the MOH of the impact of releasing this bulk of chicken on the health of the general public, the Magistrate made decision against the company with strict advice to maintain all vehicles in good sanitary condition, fined 67 USD and ordered to destroy the entire bulk quantity of chicken worth 2000 USD under the supervision of the MOH. This would set future reference/ benchmark in field of food safety in Sri Lanka to supervise and examine of temperature record by Authorized officers using smart phones on data loggers, which records should be maintained by all frozen food companies thorough out their cold chain, and it can be used as weighted and firm evidence for their legal submissions in future as a complete reflection of cold chain.

Keywords— Shelf life, food safety, enactment of food act, poultry meat, unhygienic transport, public health legislation.

I. INTRODUCTION

Shelf-life is considered as “the time period within which food is safe to consume and/or has an acceptable quality to consumers”[6]. Upon storage and distribution for a certain period, foods are exposed to a wide range of environmental conditions such as temperature, humidity, oxygen and light[11]. Storage temperature plays a major role in causing changes in quality and safety of chicken during storage. Since most degradation reactions are “arrhenius” type reactions, higher temperatures are known to speed the rate of degradation.

A typical frozen product will spend part of its shelf life in a bulk cold store, a refrigerated vehicle or container, a distribution store, a retail display cabinet or institutional frozen food storage cabinet, a period out of refrigeration during the journey from the retail outlet to home and time in a home freezer[12]. Due to these fluctuations in temperature, the food product may become microbiologically unsafe before or very close to the end of their sensory quality shelf life if temperature-abused[10].

During shelf life, the product should retain its desired sensory, chemical, physical, functional and microbiological characteristics, as well as accurately comply with any nutritional information printed on the label. Periodic determination of shelf life helps to provide assurance that the product remains consistent over time with respect to quality [7]. Many frozen meat products probably have a shelf life over two years if product quality, processing and packaging (PPP) factors are well

managed [12]. P. Zeuthen, et al., demonstrated the estimated shelf life by different temperatures for various frozen foods [10]. At 20 centigrade, chicken can be consumed after 1000 days, but if it was at 10 centigrade, it needed to be consumed before 200 days [10]. So, with declining of stored temperature maximum shelf life varies inverse proportionately.

1.1 Importance of maintenance of standard temperature

Environmental factors such as temperature, humidity and light can trigger several reaction mechanisms that may lead to food degradation. There is considerable evidence in literature that temperature plays a major role in causing changes in food quality during storage. Higher storage temperatures generally lead to increased quality deterioration.

Fluctuating temperatures cause more detrimental change in frozen foods than storage at constant temperature[11]. Food products may become microbiologically unsafe before or very close to the end of their sensory quality shelf life if temperature fluctuates [10]. But it is not practicable to store frozen foods at a steady temperature of -18 °C.

1.2 Microbial growth in frozen meat products

Minus 34°C is the lowest temperature at which a microorganism has been reported to grow[5]. *Lactobacillus sake* and *Lactobacillus curvatus* have been shown to be common species in frozen meat products. *L. sake* seems to form the predominant part of the spoilage population.

Spoilage lactic acid bacteria produce mostly lactic and acetic acids during logarithmic growth. Spoilage of vacuum packed meat is characterized by the development of sour acid odours and taste [5]. Methane, ethiol and dimethyl sulfide may contribute to the sour acid odour.

1.3 Pathogenic microbes with significant public health impact in frozen meat products

Pathogenicity of certain microorganisms is a major safety concern in processing, handling, and storage of foods. Upon ingestion of small quantities, microorganisms such as *Salmonella* species and *Escherichia coli* strains cause infection. Others such as *Aspergillus flavus*, *Clostridium botulinum* and *Staphylococcus aureus* produce chemicals in foods that are toxic to humans [9]. The more common food-borne pathogens such as *Salmonella*, *Staphylococcus aureus* and *Clostridium perfringens* belong to the group of “mesophiles”. Table 1 shows some reported minimum pH values for the growth of some/certain food-borne organisms. Sri Lankan standards for microbiological specifications of comminuted meat products are shown in table 2. The emergence of low infectious dose pathogens presents a significant challenge to predictive microbiology[10].

**TABLE 1
REPORTED MINIMUM pH VALUES FOR THE GROWTH OF SOME FOOD BORNE ORGANISMS [5]**

Food-borne organism	Minimum pH for growth
<i>Clostridium botulinum</i> , Group 1	4.6
<i>Escherichia coli</i>	4.5
<i>Lactobacillus brevis</i>	3.16
<i>Salmonella</i> spp.	4.05
<i>Staphylococcus aureus</i>	4.0

**TABLE 2
MICROBIOLOGICAL SPECIFICATIONS OF COMMUNUTED MEAT PRODUCTS[4].**

Microorganism	Limit
<i>Staphylococcus aureus</i>	Not more than 100 per gram
<i>Escherichia coli</i> (indicator)	Absent in 1 g
<i>Escherichia coli</i> O157 : H7	Absent in 1 g
<i>Salmonella</i> spp.	Absent in 25 g

II. CASE PRESENTATION

In the area of the Medical Officer of Health (MOH), Bulathsinhala, where I the first author was appointed as the Medical Officer of Health, is having a burden of malnutrition with high prevalence compared to other MOH areas in Kalutara District. There had been many programmes conducted on food availability, but little none on food security. Pre-planning for several strategies to establish food safety and security measures in the area was done for a duration of one month with the participation of Public Health Inspectors (PHI), minor staff, and support of the Food Administration Unit of the Ministry of Health. After conducting comprehensive food outlet inspections covering the MOH area and legal prosecutions over violation of law related to food safety[8], focus was shifted to inspections on primary food transporting vehicles, as most of food items were transported from outside to Bulathsinhala.

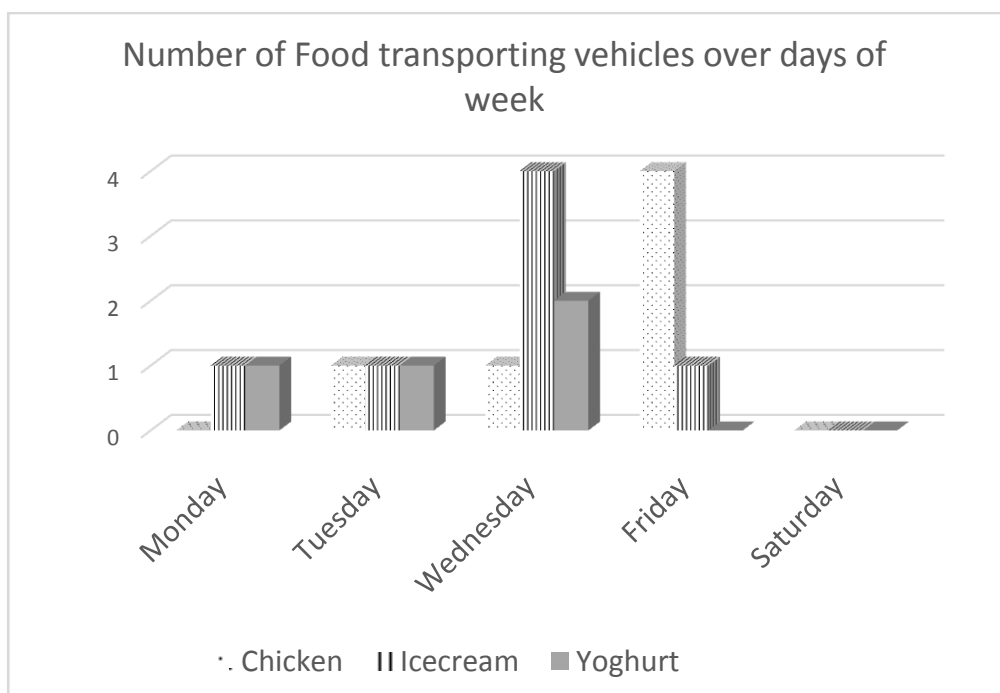


FIGURE 1. NUMBER OF DIFFERENT DIARY PRODUCT TRANSPORTING VEHICLES REACHING OVER DAYS OF WEEK

Situation analysis was carried out on dates of arriving of primary transporting vehicles to the town and its content of food items, with the support of minor staff and shop owners. The dates with the items were transformed to graph and it clearly showed that the most number and different type of primary food transporting vehicles were coming on Fridays of every week.

Inspections of food transporting vehicles were conducted since/ from 7.00 am to 11.00 am for the convenience of legal procedures before courts, as it was necessary to submit productions on the day of seizure itself. Twenty vehicles were inspected and 7 out of them were released after giving strict advice, 3 were detained to produce before courts. Almost immediately after arrest a defendant was brought into court for an arraignment. At the arraignment the defendant was read her rights and was informed of the charges against them.

- [1] Flour Lorries belonging to reputed companies of Sri Lanka, transporting flour in unsanitary/ insanitary conditions.
- [2] Three-wheeler selling bakery items, transporting bread exposing to dust.
- [3] Lorry with chicken belonging to a reputed company of Sri Lanka, not maintaining the standard temperature. (Standard -18 c, was at +5 c)

III. LEGAL PROCEDURE

None of the team members / authorized officers had experience in similar type of legal procedures earlier. It was a novel experience to all and I the first author/ MOH was named to provide expert evidence for the cases as Medical Officer of Health. By entering a plea of guilty, first two defendants were admitting their guilt and fined 67 USD each. The last case was

charged against the chicken where the company lawyer admitted a plea of guilt, but pleaded to release all chicken worth of 2700 USD.

The court requested the expert opinion from the Medical Officer of Health on this matter and was replied (verbatim): *“I am qualified with MBBS, MSc in Community Medicine and currently following MD in Public health. This company was charged under 18 (a) the sentence of penal section of No 26 of 1980 food act, **where the nature of offence involves injury to the health of the public....etc,[9]***

So, it is not possible me to release this huge amount of chicken for public consumption. Madam, Kindly grant your permission to destroy this whole set under my supervision”.

To this statement the lawyer representing the chicken company requested to send a sample of this chicken to the National Institute of Health Sciences which is the Government-approved food analysis laboratory, for analysis, and to keep the whole consignment of chicken in a sealed cold room.

The reply by the MOH when the magistrate sought the opinion of MOH at the above juncture was as follows (verbatim):

“Madam, my objection, according to the storage instructions mentioned on the packaging the product should be kept at -18 degrees Centigrade. At the time of detection it was kept at + 5 degrees Centigrade. Thereby, exposed to deterioration of quality and safety of the product for a considerable period of time. Though there has been no apparent issue at this moment, with the passage of time, during the remaining shelf life the quality of the product will be adversely affected in terms of nutritional value, flavour, appearance, and safety”.

The Magistrate accepted the opinion of the Medical Officer of Health and made decision against the company with strict advice to maintain all vehicles in good sanitary condition, fined 67 USD and ordered to destroy all chicken worth 2000 USD under the supervision of the Medical of the Medical Officer of Health.

IV. CONCLUSIONS

Chemical, physical and microbiological changes are the leading reaction mechanism of food deterioration [11]. Lipid oxidation may produce changes in meat quality parameters such as color, flavour, odour, texture, and even nutritional value[1]. Microbial contamination can cause public health hazards and economic loss in terms of food poisoning and meat spoilage. Lack of proper temperature maintenance at any stage definitely leads to growth of microbes and lipid oxidation of chicken. A formal discussion with the Approved Additional Government Analyst in Sri Lanka revealed that any chemical analysis for chicken had never been carried out by them, and if done any microbial analysis sometimes would give “no growth report” in similar type of situations mentioned above.

Regulatory provisions related to above-mentioned food safety violations are defined under the Gazette Notification No. 1724/26 dated 26.01.12 titled Food (Hygiene) Regulations – 2011[2] published under the Food Act No. 26 of 1980.

The Provision 10 (6) of Food (Hygiene) Regulations – 2011 reads as:

“Where necessary, either conveyances or containers used for transporting foodstuffs shall be capable of maintaining foodstuffs at appropriate temperatures and allow those temperatures to be monitored”. Contravention of the above provisions are punishable under the Section 18 (1) (a) of the Food Act No 26 of 1980 as amended by the Section 14 (1) (a) of the Food (Amendment) Act No 20 of 1991 and to fine not less than five thousand rupees (35 USD) and not exceeding ten thousand rupees (67 USD) or to an impressments for a term not less than six months. When considering the above fine with the recently introduced Motor Traffic law prescribing a fine of 170 USD for overtaking a vehicle on the left, a maximum fine of 67 USD for dealing with insanitary foods which are injurious to health is grossly inadequate.

It is noteworthy that there are clearly defined legal provisions related to unhygienic foodstuff/ food. The Section 2(2) of the Food Act No. 26 of 1980 states ***“ No person shall import, sell or distribute any food manufactured, prepared preserved, packaged or stored for sale under insanitary conditions”*** and ***“Insanitary condition”*** is defined as ***“ such conditions or circumstances as may contaminate food with dust, dirt or filth or render food injurious to health”***. In this regard special attention need to be focused to the terms ***“such conditions or circumstances”*** used by the legislators to define “Insanitary Condition” in a boarder manner giving opportunities to officers to express their views in wider perspectives when giving expert evidence in the Court of Law .

Maintaining of secure and proper shelf life for chicken is an essential aspect of public health in the island and Sri Lanka is still in the developing phase and the national nutritional status is in unsatisfactory levels especially among children. Despite the above the Sri Lankan legal system and legislatures related to food security have been comprehensively formulated to safeguard the health of the public.

In most European countries, cold chain of chicken is maintained to deliver safe food to people[13]. By contrast in Sri Lanka neither it is properly monitored nor supervised by legally authorized officials nor having any established system to retrieve records of temperature maintenance at any given time and at any stage of the cold chain.

Measuring and monitoring the cold chain lies with as a vacuum of making a great challenge on food safety measures. Therefore, implementing a system of placing a data lodger which records temperature fluctuations inside of any one set of bulk chicken is necessary as a future strategy to be enacted, which strategy is to be similar to the currently used monitoring mechanism for the cold chain of vaccines[3]. Using a data lodger is a matter of providers in each stage of cold chain of poultry meat and it would give an additional warranty for the next level purchaser before receiving to his outlet.

This context will be a next/forthcoming advancement in the field/realm of food safety in our country to supervise and inspect of temperature record by Public Health Inspectors through data lodger using their smartphones and it can be used as weighted and firm evidence for their legal submissions in future.

List of abbreviations:

- | | |
|---------|---------------------------|
| 1. MOH | Medical Officer of Health |
| 2. PHII | Public Health Inspectors |

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AUTHORS' CONTRIBUTIONS

LK planned, designed, completed literature survey and participated in implementation of the study (Food Inspection Measures) as Authorized Officer for food safety of study context. LK was the major contributor in preparing the manuscript. A S, R A C, P M L M and G P participated actively for implementation of food safety measures as the Authorized Officers. U I was the coordinating and supervising district officer defined by food law of Sri Lanka. P performed by contributing to the manuscript preparation, especially the sections related to food law of Sri Lanka. K supported by submitting all references related microbiological and chemical standards of Sri Lanka. SHP supervised manuscript making and carried out the final drafting. All authors read and approved the final manuscript.

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LK was post graduate trainee, reading for a Doctorate in Public Health at the Post Graduate Institute of Medicine, University of Colombo, Sri Lanka and was qualified with MBBS in Faculty of Medicine, University of Colombo and Masters in Public health.

REFERENCES

- [1] Aguirrezábal, M.M., M.C. Domínguez, J. Mateo and J.M. Zumalacárregu. 2000. The effect of paprika, garlic and salt on rancidity in dry sausages. *Meat Sci.* 54(1):77-81.
- [2] Food (Hygiene) Regulations 2011. No: 1742/26. Government notification: The Gazette of the Democratic Socialist Republic of Sri Lanka; 26 January 2012.

- [3] Epidemiology Unit, Ministry of Health, Sri Lanka. 2015. Immunization and Cold chain: available at: http://www.epid.gov.lk/web/index.php?option=com_content&view=article&id=139&Itemid=440&lang=en. Accessed 02 January 2017.
- [4] Institute of Sri Lanka Standards. Amendment No : 3 To SLS 1218 : 2001, Specification for communitied Meat Products [http://www.slsi.lk/web/images/PDF_upload/amds/amd%20164.pdf]
- [5] Korkeala, Björkroth, J. Hannu, K. Johanna. 1997. Microbiological Spoilage and Contamination of Vacuum-Packaged Cooked Sausages. *J. Food Prot.* 6:610-737.
- [6] Labuza, Ted, Dan Belina, F. Diez.: Food Safety Management in the cold chain through "expiration dating" In. Department of Food Science and Nutrition, University of Minnesota, St. Paul, Minnesota, 55108 USA: 30.
- [7] Man, C.M.D. (ed.). 2015. Shelf Life, 2 ed. John Wiley & Sons, West Sussex, UK.
- [8] No 26 of Food Act. In.: Democratic Socialist Republic of Sri Lanka; 1980.
- [9] Shelf Life Evaluation of Foods. In. Edited by C. M. D. Man AAJ; 1994.
- [10] Shimoni, Eyal and T.P. Labuza. 2000. Modeling pathogen growth in meat products: future challenges. *Trends Food Sci. Technol.* 11(11):394-402.
- [11] Singh RP: Scientific principles of shelf life evaluation. In: *Shelf Life Evaluation of Foods*. Edited by C.M.D. Man, Jones A, 2 edn. USA: Aspen Publishers, INC; 2000: 3-25.
- [12] Symons H: Frozen foods. In: *Shelf Life Evaluation of Foods*. Edited by Man CMD, Jones A, 2 edn. USA: Aspen Publishers, INC.; 2000: 296-317.
- [13] Zeuthen, P. , J. C. Cheftel, C. Eriksson, T. R. Gormley, P. Linko and K. Paulus (ed.). 1989. Processing and quality of foods: *High Temperature/Short Time (HTST) Processing: Guarantee for High Quality Food with Long Shelflife*, Elsevier Science Publishers LTD, Sweden.