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Investigation of food quality assurance in Kurdistan region/Iraq

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ABSTRACT

Nowadays, people are more concerned about the environment. Environmental protection laws have become more stringent. Hence, employing environmental friendly methods in the food industry has become necessary. Food Quality Assurance (FQA) plays an important role in all this. Food being an important element of life, the regulatory agencies has also put in place stringent requirements for its safety and quality. With the development in technology, various methods for food processing have emerged. Also Quality monitoring and guarantee ensures that the chemicals are within the specified limits in any food product. The research has been conducted at Directorate of Ibrahim Khalil border (IKB) between Iraq and Turkey. Quality Control (QC) at IKB has been regularly monitored and facilitated the export and import of food stuff across the border through Food Quarantine Laboratories (QL) and Food inspection Unit. This research conducted in order to have an idea about import inspection, monitoring program, and certification and import permission, as well as to ensure the safety and quality of food supply in the markets of Iraq.

1. Introduction

Nowadays, people have become more demanding and knowledgeable. They are more concerned about the ingredients of the food products and hence maintaining optimum quality standards in food industry has become very necessary. Food Quality Assurance (FQA) is an important issue everywhere in the world. The titles of workers in FQA positions usually include testers, inspectors, samplers, sorters, etc. Inspectors are responsible for examining the merchandise visually and sometimes with the use of special equipment to ensure it is functional. In the food-based industries, this can include tasting the food by using analytical techniques or physical and Chemical methods to be sure the correct ingredients and to be sure that the food is safe to eat and carries no risk to health. Food greatly influence the health of population, therefore food quality control is an important government activity and is legislatively regulated. Food Quality is defined by the International Organization for Standardization (ISO) as" the totality of features and characteristics of a product that bear on its ability to satisfy stated or implied needs." In other words, good quality exists when the product complies with the requirements specified by the client (Van Reeuwijk, 1998). Safe quality is the characteristics of food safety (Anderson and Anderson, 1991). Food safety is defined as the assurance that the food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use (FAO/WHO, 1997). Thus food safety assurance involves the reduction of risks. Safety and FQA should be on-going processes incorporating activities beginning with selecting and preparing the soil (for planting) and proceeding through to consumption of the product. Previous studies (Anderson and Anderson, 1991; Bredahl and Grunert, 1997; Grunert et al., 2004; Davídek, 2009) suggest that perceived food quality may include four dimensions: 1- taste quality, 2-nutritious quality, 3-safe quality, and 4- convenience quality. Taste quality is the food-attribute evaluations by the perceptions of taste, texture, smell, and appearance. Nutritious quality relates to the perception of food health. Safe quality is the characteristics of food safety. Convenience quality is reflected by easy to use savings of time and effort (Reeves and Bednar, 1994; Olsen, 2004; Ho and Le, 2014).

Today, Food Borne Diseases (FBD) is of serious concern. Its frequency is not known because a great majority of the cases go unreported. Most are passed off as traveler's diarrhea, or upset stomach. Salmonellas are, one of the more serious FBD. For example, in the USA, there are about 4.2 million cases of Salmonella food poisoning annually despite the fact that the U.S. food supply is considered very safe and processed under the best conditions. Food

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scientists, and food processors, focus most on microbiological quality. Microorganisms pose a challenge to the food industry. Microorganisms are often too small to be seen with the unaided eye and have the ability to reproduce rapidly. Many of them produce toxins and can cause infections. Therefore, testing the foods for the presence of pathogenic microorganisms is very important, and the microbiological quality of the food is scrutinized closely.

With a view to raise awareness among the consumers about food safety and quality, a number of awareness programs, meetings, and workshops had been conducted in Kurdistan Region (KR)/Iraq. Quality Control (QC) at Directorate of Ibrahim Khalil border (IKB) in KR between Iraq and Turkey has been regularly monitored and facilitated the export and import of food stuff across the border through Food Quarantine Laboratories as well as Food inspection Unit. The main objective of quarantine laboratories is to inspect food products in the custom point to check the quality of food as well as to certify them within the domain of food export-import directives, before import and export. To our knowledge, no published studies to date reported about monitoring the imported food stuff, and Food inspection in the custom point in coordination with custom office which check the quality of food through Food Quarantine Laboratories across the Gate of Ibrahim Khalil border (IKB) between Iraq and Turkey. This study was conducted in Gate of IKB, during 2014 and 2015. The major goals of this study are the following: 1- To have an idea about import inspection, monitoring program, and certification and import permission. 2-Ensure the safety and quality of food supply in the markets of Iraq, and to improve the nutritional status of Iraqi people. 3- To ensure Effective enforcement of Food and Feed act and regulations, as well as to ensure execution of laws and regulations and education/awareness to producers, traders and consumers in partnership with government agencies, industries, and consumer associations.

2. Methods of research

The study conducted through field visit to Food Quarantine Laboratories (QL), Quality Control (QC) and Food inspection Units, at Directorate of IKB between Iraq and Turkey, to stand up close directly about the size of various goods and foodstuffs imported from Turkey and other countries that have increased in recent years. It monitors the import inspection, and certification and issues the import permission. Seven groups of food were included in the study (Table 1); assessment of food FQA at IKB basis of biological, chemical, biochemical and physical testing in the laboratories of the Directorate of IKB. Several equipment's and instruments have been used at IKB, such as: Autoclave, Colony counter, Incubator, Multi filtration system, Stomacher, Sieve shaker, Muffle furnace, Moisture balance, etc.

2.1. Case study and sampling

The Case Study or the study sites refer IKB crossing between Turkey and KR. It situated abut (9 km) from Zakho city. Express through it a various goods and equipment, food, where samples of these materials are subject to various laboratory tests. The study included different food items. The study had starting in January up to October 2014 and April up to May 2015. Where start working classifies food into 7 groups as given in Table 1. These materials are subject to initial examination random samples in different areas of each vehicle of those articles where visual inspection on those samples and then subjected to laboratory test, to give the final decision on the validity of those materials for human consumption.

2.2. Quality attributes

There are a number of ways of studying the quality attributes of food products. One way is to look at the occurrence of the characteristics as the product is encountered and consumed. Quality attributes are often classified as external, internal, or hidden (Pattee, 1985). External quality attributes are those that are observed when the product is first encountered. These attributes are generally related to appearance and feel. They are perceived by the senses of sight and touch. The smell of a product, particularly for very aromatic fruits and vegetables, may be an external attribute but usually is more closely related to internal attributes. External attributes are often playing an important role to acceptable passing or not (Satin, 2000). Acceptable levels of these attributes often affect the consumer's decision to purchase the same product again. The combination of external and internal attributes determines the acceptability of a product (Pattee, 1985). Hidden attributes, are more difficult to measure or differentiate. Hidden quality attributes include wholesomeness, nutritional value, and safety of a product (Kramer and Twigg, 1973; Shewfelt, 1990).

Table 1: Classification of food groups included in this study

Group	Food articles	Group	Food articles
A	Various meat products	E	Aquatic Meat products
B	Various dairy (milk) products	F	Pizza
C	Special items (Maggie, sauces etc.)	G	Table eggs
D	Feed material and Feed additives		

2.3. Measurement of quality attributes

External Attributes: Appearance includes size, shape, gloss, color, and absence of defects. Measurement of size and shape: through visual guides. While for color: visual or mechanical methods have liked colorimeters, spectrophotometers (SP). Firmness or how the product feels when touched. Measurement of firmness: by mechanical means. Defects may be due to production, handling, environment, diseases, etc. Measurement of defects: visually and mechanical methods like ultrasound, machine vision.

Internal Attributes: Odour or aroma is the sum of the compounds perceived by the nose. It is very difficult to determine objectively. Measurements of odour: by gas chromatographs (GR), or mass spectrometers. Taste is the perception of chemical compounds on the tongue. Measurements of taste: by SP and gravimetric methods, liquid and GR. Texture is related to the structural elements of a product. Its measurements: by amount of force applied.

Hidden Attributes: Wholesomeness is a relatively difficult attribute to measure objectively. This attribute involves a "sanitary" component (how clean/hygienic is the product) and the presence of foreign materials. Measurements of wholesomeness: Microscopic, microbiological, etc. Nutritive value is related to the presence and levels of components that support life. Measurements of nutritive value: wet chemistry, GR, and physical tests.

3. Results and discussion

The detection and screening of different food items at the IKB is a very challenging and responsibly duty that needs accurately work and also a fast process. Moreover the classification of size and quantity of food that entering the border is very necessary. To facilitate this study the food and goods that entered the boarder in the period of 01/01/2014-31/10/2014 are divided into 7 groups. The food and goods that are passing the border are divided into 2 types. One of them passes the border because of confirming the FQA and other being destroyed because of not fulfilling the quality assurance. The FQA in this context is based on the specific law of Iraq 1984, the law in accordance with section 68 article 23 and also the agriculture law of 1966 - section /Act 17 and in addition the general health law of 1981 in accordance with section /Act 89. The 7 groups of food were included in this study are listed in the Table 1, e.g. Group D (food supplements and feed additives), The results show that some of the goods and food are not in correspondence to the FQA, or laboratory tests show that they could affect the human health and therefore has been destroyed. Table 2 shows the results for the period of 01.04.2014 until 31.05.2014 (i.e. for 2 months). Presence of microorganisms-MO in foods and their growth and/or production of toxins depend on various factors. Composition of foods in terms of their nutritive value, water content, and several other factors contribute to the contamination, growth of MO and formation of toxins harmful to human or animal health. Table 3 shows the results for the period of 01.04.2015 until 31.05.2015 (i.e. for 2 months). The data collected of the above period compared with the similar period of 2014 shows that the % amounts of food and goods, which do not fulfill the FQA in the year 2015, are much lower than that of year 2014. The main reason could be refer to the customs worker apply or put in place stringent requirements for its safety and quality in 2014, compared with previous years (e.g. for 2013), or due to the implementation and improvement of health conditions required by the exporting companies, and conditions for the entry of those nutrients in the field of inspection and FQA. Table 4 shows the data of the 7 mentioned groups for the period of 01.01.2014 until 31.10.2014. It includes the amount and percentage of food and goods that are passing the border, non-passing the border and the amount of which is being destroyed. Compared to the other groups, group C, has the highest % in non-passing and destroying.

Fig. 1-a shows the % amount of each group of the food that passed the border. The group D is the largest. Fig. 1-b shows the % amount of each group of the food and goods that didn´t pass the border. Food contamination or infection may occur at various stages starting from harvesting of food grains, post-harvest processing, storage, etc. The preservation and keeping quality of food and food materials depend mainly on their composition and water content. Long term preservation or storage of food or food materials brings changes in their chemical composition and nutritive value. These changes could be due to physical, chemical or MO activities occurring. The group C shows the largest amount. Fig. 1-c shows the % amount of each group of the food that didn´t pass the border and being burned.

Table 2: Data of the 7 groups for the period of 01/04 to 31/05 of 2014

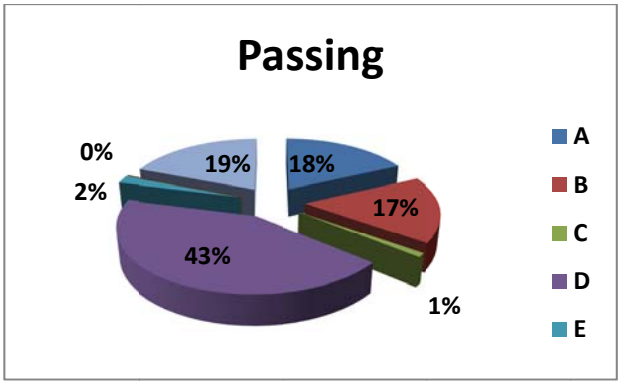
Group	Passing	Non-passing	Burning	Non-passing [%]	Burning [%]
A	543320	93773	2739	17.259	0.504
B	8087557	33488	1850	0.414	0.023
C	586755	51059	1725	8.702	0.294
D	17851501	141712	17522	0.794	0.098
E	337000	0	0	0.000	0.000
F	65000	0	0	0.000	0.000
G	3140158	33488	0	1.066	0.000

Table 3: Data of the 7 groups for the period of 01/04 to 31/05 of 2015

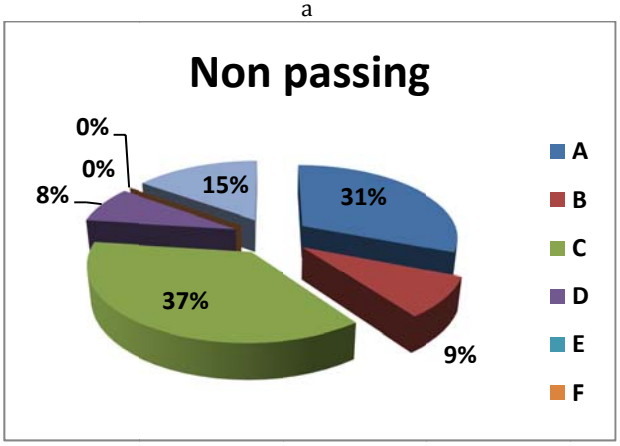
Group	Passing	Non-passing	Burning	Non-passing [%]	Burning [%]
A	15994853	32170	2540	0.201	0.016
B	15210224	1507	16165	0.010	0.106
C	1203343	3400	18449	0.283	1.533
D	59186884	0	0	0.000	0.000
E	1855055	0	0	0.000	0.000
F	102120	0	0	0.000	0.000
G	18880836	6100	0	0.032	0.000

Table 4: Data of the 7 groups for the period 01/01/2014 until 31/10/2014

Group	Passing	Non-passing	Burning	Non-passing [%]	Burning [%]
A	45843942	471187	103242	1.028	0.225
B	44708151	145274	134300	0.325	0.300
C	3561004	563412	61818	15.822	1.736
D	111402122	115500	1032500	0.104	0.927
E	4310812	0	0	0.000	0.000
F	238900	0	0	0.000	0.000
G	49588826	226566	24960	0.457	0.050



a



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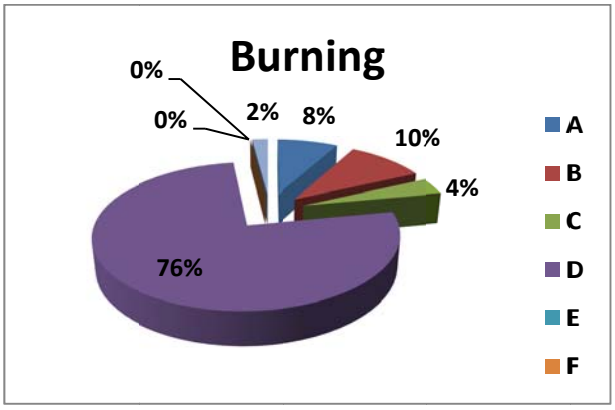

c

Fig. 1: The percentage amount of each group that (a) passed the border. (b) Rejected to pass the border. (c) Didn´t passes the border and being burned

The group D shows the largest amount. Materials do not exist in the permitted login lists. And the other part was destroyed (buried or burned) due to the expiry date of the food, prohibited substances such as hallucinogenic drugs, decadent or rotten food, food for hormone processing.

4. Conclusions

In this study, we classified food and goods that entered the gate of Ibrahim Khalil border into seven groups. Some of the foods are not good from the proper packaging hand, lighting, storage; time, high moisture content, heat, and other physical effects play a significant role in deterioration and decay the products or the food.

These factors enhance during the transportation of those good, due to poor ventilation, or high humidity, temperature, and lighting. It was found the that the food group (D) (Feed material and Feed additives) is the largest food group that has been destroyed from the period between 01/01/2014 to 31/10/2014, due to the lack of required conditions or regulations.

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