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# USING MANAGEMENT INFORMATION SYSTEM APPROACH IN VERIFICATION OF HACCP APPLICATION IN LUNCHEON PRODUCTION

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## ABSTRACT

In a trail to utilize Management Information System in establishment of food/feed **safety** control system; a study was conducted to designs a replied **quality** control inspection system which can be applied in food manufacturing stockholders including official inspection authorities. Samples from Luncheon were collected from different **Egyptian market** sources categorized according to their hygienic and price level and were analyzed to evaluate their safety condition. Data obtained from the analysis results showed that samples collected from **lower quality and price** regions had **higher** health hazards if compared to these collected from higher quality and price regions. Results obtained from application of the used **modern management information system** and the mentioned **quality control systems** revealed that, by using these devices and inspection program (s), both the official bodies and the producers themselves can cooperate to improve the inspection/production activity to assure compliance of the end product with the safety guidelines and subsequently human/animal/environmental safety.

***Key Words*:** Quality Control, Inspection, HACCAP, Luncheon, Total Plate Count, Sodium Nitrite.

## INTRODUCTION

In the age of great information technology and evolution of Internet, development of a management information system that uses these modern technologies in the formation of step by step monitoring approaches, maximize the benefits of such information and thus facilitate the task of achieving "**safety**" and "**quality**" of **food** and **feed**.

Considering that, food-borne diseases caused by infectious or toxic agents that enter the body by ingestion of contaminated food and/or water, cause health problem in many developed and developing countries**.** The main causative agents of food/feed poisoning are bacteria (66%) and viruses (4%). Also, food borne illness is resulting from either intoxication, which occurs when toxin produced by the pathogens inters gastrointestinal tract, or infection that caused by ingestion of food containing pathogen itself. Botulism, *Clostridium perfringens* gastro enteritis, *E. coli* infection, *Salmonellosis* and *staphylococcal* food poisoning are the major food illnesses

caused by bacteria. The most common clinical symptoms of food-borne illnesses are diarrhea, vomiting, abdominal cramps, headache and nausea**.**

Hence, food safety is one of the most important topics and goals pursued by all countries and peoples, for which millions of funds are spent and many international and regional bodies and organizations devote all their efforts and energies to reach this goal as it has a direct impact on humans, causing many of the negative effects that sometimes lead to the death.

The quality of **food** and **feed** is **complementary** to its safety, therefore, the concept of quality and safety is considered complementary to each other. Having a quality control approach and having a reliable tool for verification of its application is considered as critical points to assure obtaining safe food/feed with the required parameters that comply with the international and/or national standards.

One of the most internationally agreed systems as a mean of ensuring food "safety and quality" is **H**azard **A**nalysis and **C**ritical **C**ontrol **P**oints (**HACCP)**, which is a regulatory system that focuses primarily on the safety of food in a way of identifying the sources of **risk** at all stages of production of food "**from farm to fork**" including preparation, manufacturing, transportation, handling, etc., where the stages of manufacturing are identified through the so-called critical control points at which real risks can be elaborated and which when controlled it resulted in prevention and exclusion of any danger that may threaten the safety of food or it may be reduced to a safe and acceptable level.

The aim of this work was to study some biological and chemical safety parameters of **Luncheon** as representative of the most commonly consumed food of **animal origin** and development of management information system as a monitoring system includes HACCP plans, data bases, check lists, reports, compliance certificates and other inspection requirement data.

## MATERIALS AND METHODS

### LUNCHEON SAMPLES:

Luncheon samples were collected from different Egyptian markets and were classified according to its price category as illustrated in table (1).

**Table No. (1): Luncheon Samples Categorization:**

| No. of Samples | Price by Egyptian Bounds | | Category |
|---|---|---|---|
| | To | From | |
| 9 | 100 | 70 | **High** |
| 9 | 69 | 20 | **Low** |
| **18** | **Total** | | |

## MEDIA, CHEMICALS AND REAGENTS USED IN THE ANALYSIS:

## MICROBIOLOGICAL EXAMINATION:

- Buffer I: Typical Formula (g/l)
  NaCl 8.5g
  Peptone 1.0 g
  pH 7.0 ± 0.2 at 25°C
- Nutrient Agar (Lab M 2012).
- Violet Red Bile agar (VRB) (Lab M 2012).

## CHEMICAL EXAMINATIONS:

- Dionex™ IonPac™ AS11-HC-4µm IC Columns
- 45 µm filter syringe
- NO2 standard

## MOLECULAR BIOLOGY EXAMINATION:

- **Maxwell 16 Cell DNA Purification Kit:**

## INCLUDES:

- 48 Maxwell® 16 Cell DNA Cartridges
- 50 Purification Plungers
- 50 Elution Tubes
- 20 ml Elution Buffer
- Master Mix (MM): The SYBR® Green PCR Master Mix is supplied in a 2X concentration and contains sufficient reagents to perform 200 50-µL reactions. The mix is optimized for SYBR® Green reactions and contains SYBR® Green I Dye, AmpliTaq Gold® DNA Polymerase, dNTPs with dUTP, Passive Reference, and optimized buffer components.

- Primers: Primers (Macrogen, Korea) were designed according to Dalmasso *et al.,* (2004) the nucleotide sequences.

## MICROSCOPIC INSPECTION:

- Freeze-dryer.
- Paraffin oil.
- Norland adhesive.
- Polarizing microscope.

## METHODS:

### SAMPLE PREPARATION:

### FOR MICROBIOLOGICAL ANALYSIS:

- Samples were collected in sterile plastic bags under strict hygienic measures.
- All samples were transported to the laboratory in icebox and kept at 4ºC till the day of analysis.
- On analysis day, 5 gm were sub sampled from every sample under complete aseptic conditions and were put in sterile stomacher bag to gather with 45 ml of phosphate buffer diluent.
- The stomacher bag was put in stomacher for 2 min after which the sample became ready for further analysis.

### FOR SAMPLE PREPARATION FOR CHEMICAL ANALYSIS:

Fat in samples was hydrolyzed prior to quantitative analysis to protect the column chromatography anion (IonPac AS 11-HC) column chromatography. After dilution of samples, they were filtrated using 45-µm filter syringe.

### FOR MOLECULAR BIOLOGY ANALYSIS:

The collected samples were placed in sterile sampling bags, and transported inside a refrigerated container kept at 4°C for sample preparation and DNA isolation. The pieces taken by means of lancet and spatula were homogenized in a blender.

### FOR MICROSCOPIC INSPECTION:

One sample from every category was freeze dried, ground and subjected to a sedimentation procedure to separate any solid parts from the other tissues.

### MICROBIOLOGICAL ANALYSIS:

#### TOTAL PLATE COUNT:

- Transfer an aliquot of prepared sample ($10^{-1}$) to a test tube containing 9 folds of diluent to have a final dilution of ($10^{-2}$).
- One part was taken to another test tube contain 9 folds of a diluent to have a final concentration of ($10^{-3}$).
- Repeat until reaching to ($10^{-5}$) and good mixing with vortex was performed in each step.
- One empty and pre- sterilized petri dish was inoculated with 1ml of each dilution before adding 10-15 ml molten nutrient agar previously cold to 45 ±1°C. Then mixed well.
- Plates inverted after solidification and incubated at 30±1°C.for 48hrs.
- Plates of average values between 10-100 colonies were selected and results were reported as multiplied by the dilution factor.

**FECAL COLIFORM COUNT:**

- Transfer an aliquot of prepared sample ($10^{-1}$) to a test tube containing 9 folds of diluent to have a final dilution of ($10^{-2}$).
- One part was taken to another test tube contain 9 folds of a diluent to have a final concentration of ($10^{-3}$).
- Repeat until reaching to ($10^{-5}$) and good mixing with vortex was performed in each step.
- One empty and pre- sterilized petri dish was inoculated with 1ml of each dilution before adding 10-15 ml molten violet red bile agar previously cold to 45 ±1°C. Then mixed well.
- After solidification of the medium, add to the dish a covering layer of molten violet red bile agar.
- Plates inverted after solidification and incubated at 44±0.5°C.for 24hrs, bacterial colonies appear dark red colonies, which have diameter at least 0.5 mm and surrounded by a red precipitation zone.
- Plates of average values between 10-100 colonies were selected and results were reported as multiplied by the dilution factor

- **SEMI-QUANTITATION OF BEEF CONTENT:**

**DNA EXTRACTION:**

**Maxwell 16 Cell DNA Purification Kit (3.1.2.3.) was used (Promega, Madison, WI, USA) according to the manufacturer procedure as follow:**

- Transfer 50mg from Sample (3.2.1.3.) to Maxwell kit of the pre-dispensed cartridge.
- Transfer cartridges containing samples and plungers from the cartridge.
- Preparation rack onto the Maxwell 16 (Promega, Madison, WI, USA) platform. Ensure that the cartridges are placed into the instrument with the ridged side of the cartridge closest to the door.
- Place one blue elution tube for each cartridge into the elution tube slots at the front of the platform.
- Add 300µ1 of elution buffer to each blue elution tube.
- Press the "Run/Stop" button. The platform will retract. Close the door.
- Follow on-screen instructions at the end of the method to open the door.
- Transfer the eluted samples into storage tubes by pipetting.
- Discard the blue elution tubes after transfer of the eluted sample.

**MEASUREMENT OF DNA PURITY AND CONCENTRATION:**

The concentration of extracted DNA was estimated using spectrophotometer (Nanodrop, ND1000, USA) by calculating the ratio between the optical density at 260 and that at 280. Pure DNA was estimated at 1.8.

**PCR ANALYSIS:**

A- **PCR SETUP:** PCR setup as illustrated in Table (2).

**Table (2):** pcr setup quantities

| Volume (µl) | Components |
|---|---|
| 12.5 | 2X SYBR® Green PCR Master Mix |
| 2.5 | Forward Primer |
| 2.5 | Reverse Primer |
| 2.5 | Free DNase & RNase water |
| 5 | Template DNA |
| 25 | Total volume |

**B- PCR PROTOCOL:**

The real-time PCR assays were performed on a fluorimetric thermal cycler 7500 Applied Biosystems Real-time Detection System (Applied Biosystems, USA) using the following conditions: 95 °C for 5 min, 45 cycles at 95 °C for 30 s and 65 °C for 1 min, with collection of fluorescence signal at the end of each cycle. For melting curve data, the temperature was increased by 0.5 °C from 65 °C to 94 °C. Data were collected and processed using an Applied Biosystems Real-Time Detection System Software (**Soares et al., 2013**).

**CHEMICAL ANALYSIS:**

**DETERMINATION OF SODIUM NITRITE:**

Nitrite in luncheon samples was determined using Dionex high performance ion chromatography. Samples were injected at the calibration of the instrument with standards that bracketed the expected diluted samples range (0, 10, and 20) ppm NO2 standard. For quality control, a certified standard was injected to assure quality control and the diluted samples concentrate was assuring to lie inside the celebration. Final sample concentration was obtained via feeding the software with sample weight (N 0.1 – 0.2 g) and dilution factor.

**MICROSCOPIC INSPECTION:**

- Material was observed in slides mounted with water, paraffin oil or Norland adhesive by polarizing microscope according to analytical method for monitoring animal proteins in compound feed in the European Union **(European Commission 2013b).**
- Slides were prepared from reference materials as well.
- Sediments of the examined samples were sieved and the fraction with particle size between 80 and 250 µm was used.
- A total of 1 mg was evenly distributed over two slides, paraffin oil was added and the number of particles was counted independently by two technicians.
- After that, 4.5 mg of the fraction finer than 250 µm of a PAP-free mineral premix were added making a concentration of 10%.

- Examination of the untreated sediments was performed as well with sediments stained with Alizarin according to the European Union procedure (European Commission 2013b).

## INFORMATION MANAGEMENT SYSTEM:

Data and information of the collected luncheon samples were entered into the data base of the suggested system, which its logical design was as follow:

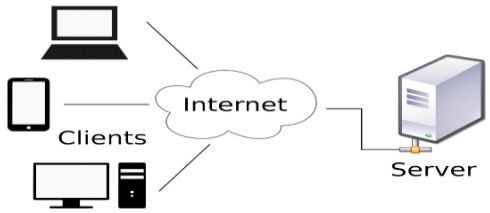



**Figure No. (1):** The logical design of centralized data base

Important to the centralized data base is the heart of the system as it contains the data of all the parties participating in the work cycle, such as the data of the companies and their branches and stores - photocopies of the company's documents - the registration data for the manufacturing of the products - the data of the required missions and their implementers.

Also, it is the main way the inspectors can obtain the information necessary for them to perform their work at the same time and from anywhere. By using the centralized database, the users can prepare the inspection minutes and the necessary reports about the mission online without any interference from anyone. All the differences that were recorded by the inspector are immediately identified and communicated to those responsible for the control, the operations room and the follow-up.

This system built by using Microsoft SQL database server which is a relational database management system developed by Microsoft. As a database server, it is a software with the primary function of storing and retrieving data as requested by other software applications—which may run either on the same computer or on another computer across a network (including the Internet).

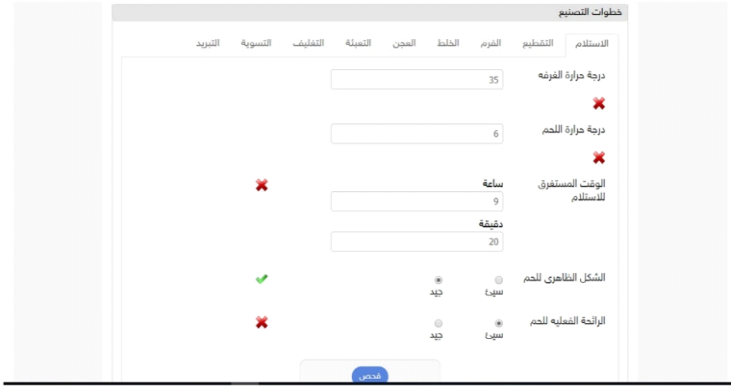
## RESULTS AND DISCUSSION

As food safety is considered as a very important target for healthy and productive life style, ensuring the obtaining of safe food is a major demand for every person. Determining of the current situation concerning the safety parameters of available food is crucial to start a successful plan for controlling health hazards.

So, making a minor survey on luncheon as a very common in eat products used with all ages was very important to make a bench work of the current situation of the presence of sodium nitrite as a very important chemical hazard and the count of total bacteria as on indicator of good hygienic situation during processing. Also, determination of the meat protein present in the examined samples either lay semi-quantitation technique using molecular biology approach or by microscopic inspection,

also was very important to judge the quality of the processed tested samples. The researcher relied on using the steps of the proposed system to conduct inspections of the luncheon outlets and the feed factories, starting with the step of reviewing records and documents until the step of sampling, according to the following figure.

The samples retrieved using the proposed **information system steps** were subjected to the necessary **laboratory analysis**, which showed excellent effectiveness in the implementation of the inspection, monitoring and control. The system has been used in all stages of inspection and control, which are determined through the instructions and controls of the HACCP system and the Egyptian standards specifications. The system introduced the situation seen by the inspector himself, which led to the rejection to the system and recording the violations of the tracking room and operations at the same time that the statement is recorded as in screen (1).




**Screen No. (1):** System Refuse Screen

As for food control tasks, the same information system was used to control luncheon outlets from low-level markets and high-level supermarkets. The system recorded bad storage methods of Luncheon for low-level shops in contravention of Egyptian standards as described in Picture No. (1).

**Picture No. (1): Poor storage of Luncheon for low-level shops**

The information system Also, reported a good method to store the luncheon was observed accordance with the Egyptian standard specifications as shown in the following (picture No. 2).

**Picture No. (2): Good storage of Luncheon for high-level shops**

Based on using the system as explained, the samples that were treated in the laboratory were collected according to the following table:

**Table (4):** Total bacterial count presents in different categories of Luncheon samples:

| Category 2 | Category 1 | Analysis |
|---|---|---|
| $34 \times 10^4$ | $48 \times 10^5$ | TPC (cfu/g) |
| 1040 | 105 | Sodium Nitrite (ppm) |

**Table (5):** Ranges of the estimated safety parameters obtained from tested samples:

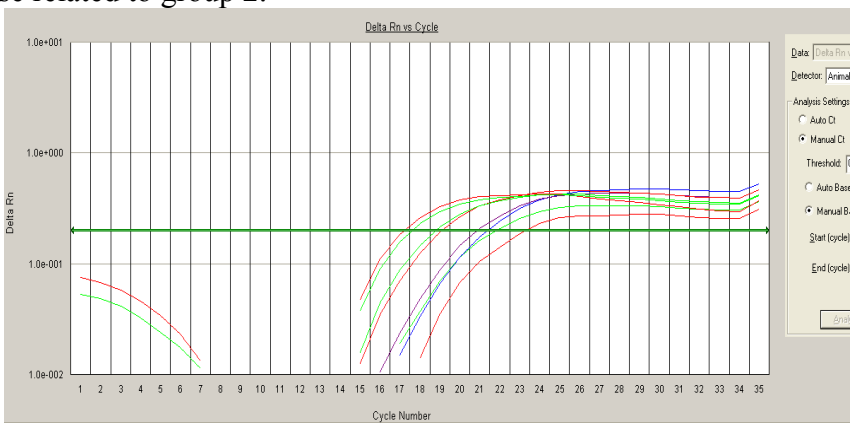
| Category 2 | Category 1 | Analysis |
|---|---|---|
| $32 \times 10^3$ - $89 \times 10^4$ | $50 \times 10^5$ – $90 \times 10^5$ | TPC (cfu/g) |
| 620 – 1740 | 100 – 110 | Sodium Nitrite (ppm) |

It is clear from data obtained in table (4) that classification of the source of the purchased Luncheon samples into high and low price level showed a reflection on its safety conditions as comparing of the obtained total bacterial counts values illustrated that the value obtained from the tested samples with the higher price within the permissible limit as determined by codex alimenestarious committee concerning "Specifications of Luncheon" which mentioned $10^5$ cfu/g as the maximum permitted count for ready to eat luncheon (CODEX ALIMENTARIUS COMMISSION Fifteenth Session 1983 Rome, 4-15 July 1983). From Table (5) it was clear that the minimum obtained TPC value was $50 \times 10^4$ cfu/g and the highest value was $90 \times 10^5$ cfu/g which showed normal expected results. In contrary, TPC value of the tested samples with the lower price significantly lower than that obtained from the samples from the highest price group which was against the expected results as it was expected that the lower the price is, the lower the safety parameters and the higher the TPC value is.

But, fortunately, this result was explained by the terribly high concentration of Sodium Nitrite in the group of samples with lower prices as this chemical has antibacterial effect and is used as preservative in many food products specially processed meat products. So, the presence of this very high concentration of Sodium Nitrite significantly lowered the total bacterial count due to its antimicrobial effect not due to the better microbial quality.

Antimicrobial effect of Sodium Nitrite when used as preservatives in beef products processing. Also there was a strong correlation between the quality and safety of meat products and the hygienic status of it as an end product. In this study, it was clear from data illustrated in "Figure2" that the amount of beef in samples related to group 1 is higher than that related to group 2 as the intensity of the light of the relevant based in the electrophoresis result is higher in the DNA extracted from Luncheon

Samples related to the DNA extracted from Luncheon samples related to group 1 if compared of those related to group 2.




**Figures( 2 ) : Illustrated the pattern of the amplification curves of the positive samples. It is clear that the tested samples were considered positive when their amplification curves could pass the threshold line and form the characteristic plateau shape**.

This also was confirmed by the results of microscopic inspection as illustrated in "Figure 3" as the amount of muscle fiber present in the examined field of the slide constrained the prepared samples from group 1 was higher than that related to samples from group 2. This was considered as a second price of assuring information that, the lower price is, the lower the quality is and the lower the principle ingredient content is.

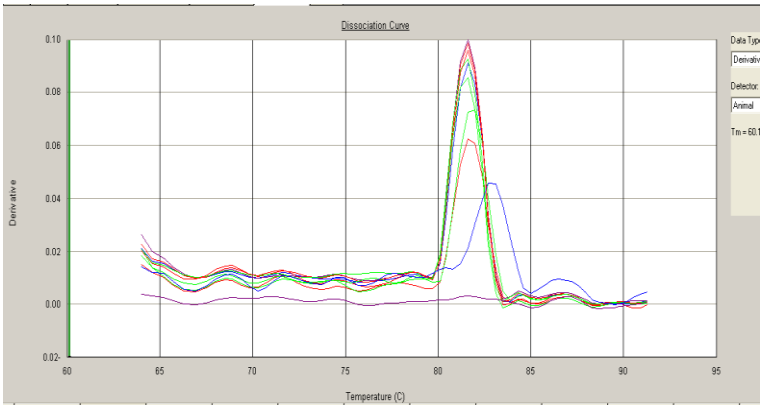



**Figure (3): The melting curves of the positive samples came in the same point of the curve belonged to the control positive DNA of ruminant forming this clear bundle, while the melting curves in the blue bundle were considered as negative samples as their melting point differed from that belongs to the control positive one.**

This finding was supported by that obtained from data concluded that, PCR technique and microscopic inspection approach can be relied an un determination of animal protein / muscles caste in food of animal organic and its products. The obtained results in this study showed that there is a real need for settlement of a quality control approach which must control the steps of production process to obtain a safe sound product with high safety and quality condition and with a good compliance with the national/international standards for food laws and specifications.

The required quality control system must be documented, reviewed, verified and monitored not only by the competent control authorities but also by the producer himself in a needed collaboration step between the producers (Private Sector) and the inspector (governmental official sector) to reach a high reliable national food safety

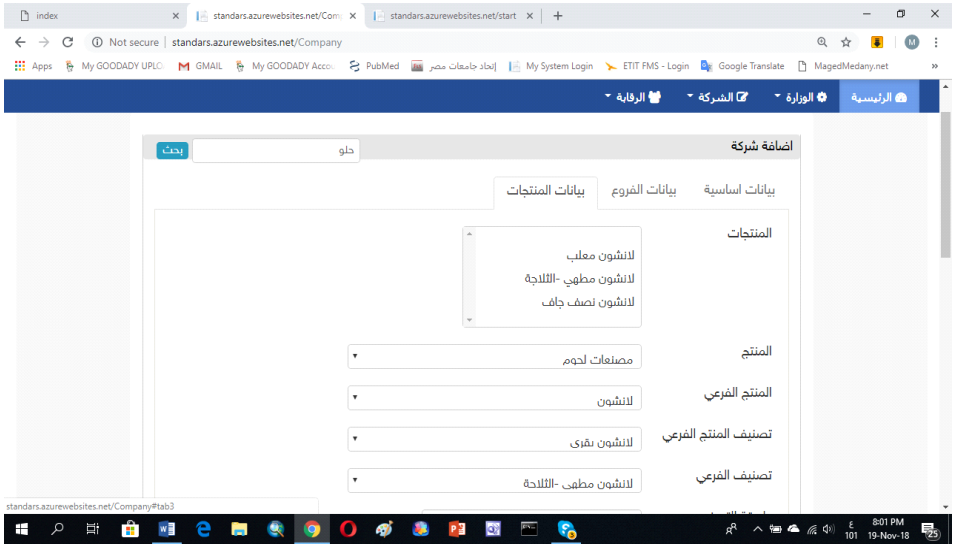
and quality level. The quality control system of choice as reported by Wareing, 2010; Al-Kandari *et. al*. 2011; Kafetzopoulos *et al.,* 2011; Davies *et. al.,* 2012; Tomasevic *et al*., 2015.,Is the HACCP approach which is considered as the most important monitoring technique needed to assure good safety and quality level in meet production sector.

Also this approach is very much needed in the field of feed production which reported in the field of feed production which represents a very important component in food safety phenomena as hazards present in unsafe contaminated/polluted food/feed materials can simple reach human, animal and/or environment through the food production chain causing a deleterious effect on all affected elements. This fact is stated the quite subsequent relation between feed safety and food safety.

Also, the occurrence of chemical analysis and/or biological hazards in feed and its ingredients harms animal health and subsequently human and environmental safety. The proposed integrated digital content system used in this study composed of many factors which together tightened the monitoring system either official is or the in house are.

Through this website, companies are guided to the correct steps based on the specifications of the HACCP system for the different manufacturing process and the method of storing the products. Also, by using this website we can follow up the step s of manufacturing for beach product that are carried out within the companies during their occurrence Monitor the steps of the manufacture of products carried out within companies during their occurrence and register any violations that occur immediately.

**The following are the print screens of the management information system interactive site**:




**Screen (2): Product Data Screen**

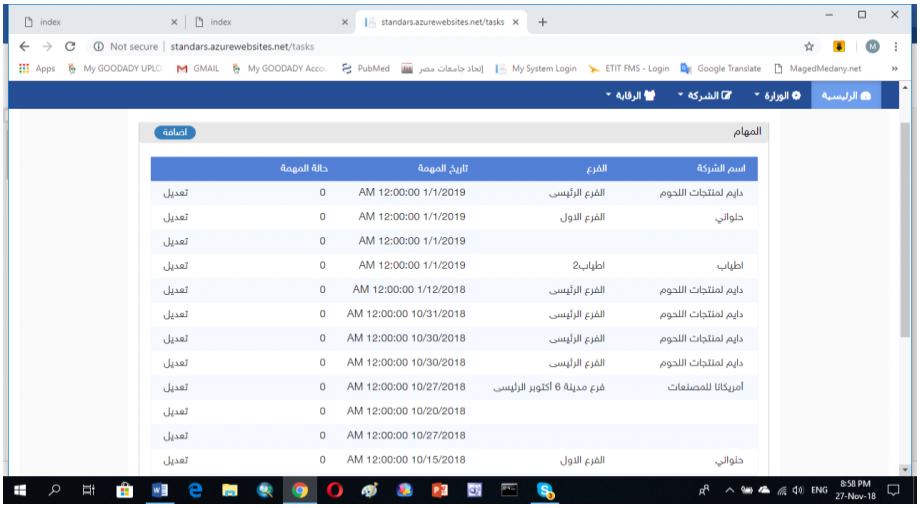
Through this screen are entered the data of the products that have been approved for the manufacture of each company - the method of manufacturing and specifications of the product and the proportions of its components and storage conditions and method of dealing...

The importance of this screen is considered as the law that the company must abide by its conditions during manufacturing, warehousing and trading operations. This data is also the basis of the inspection and control process, which the inspector calls the system during the inspection process, and whether it is implemented or not, and any violation of the data entered from this screen is considered a legal violation.


**Screen (3): HACCP Standards Screen**

Through this screen you enter both definitions and criteria of the conditions and controls of all manufacturing and storage wagons, the minimum and maximum limits for each stage, the identification of critical control points based on HACCP standards, which ensures the safety and quality of products during manufacturing, warehousing and handling.

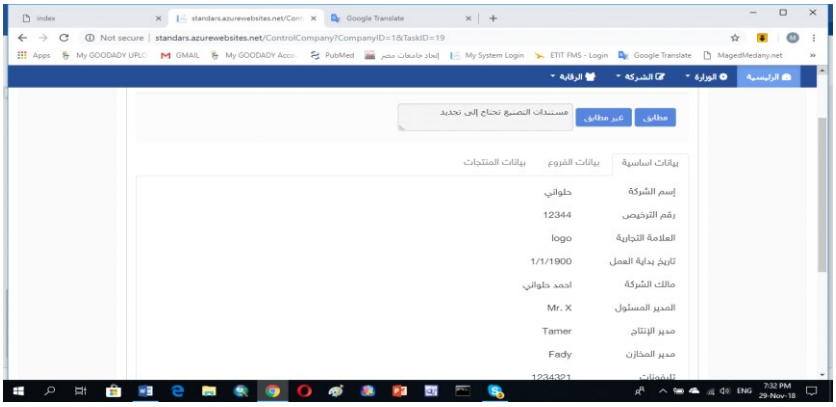
The importance of this screen is through the introduction of the basic determinants of manufacturing processes which, when followed and complied with during manufacturing, storage and trading processes, ensure the safety and quality of food and feed. It is also the main inspector of the inspector to ensure the safety of the manufacturing, storage and handling loops, and make identification of any deviations or irregularities, so that can perform the mission with utmost accuracy and impartiality.




**Screen (4): Inspection Tasks Screen**

The function of this screen is to determine the tasks of inspection and control of companies, warehouses and branches, which are done automatically through equations within the system itself, and without the intervention of humans so that the automatic selection of a company and linked to the names of inspectors and set a date for them automatically. In addition, there is also a usual manual selection method function "if necessary".

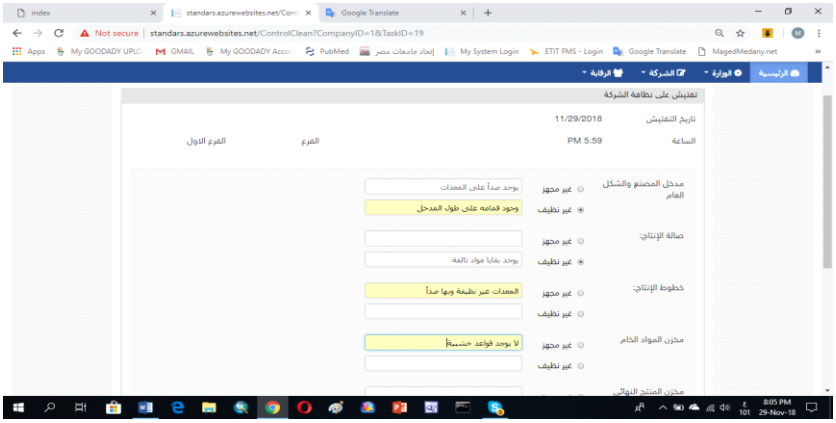
The importance of this screen is a full guarantee of the neutrality of the commission and the non-interference in the selection of specific people to carry out a specific task to reduce the proportion of manipulation.



**Screen (5): Documents Inspection Screen**

By this screen the inspectors can inspect company documents (Registration forms - Manufacturing Approvals- etc.), where the system displays a replica of this documents for the inspectors so they can match it with the official originals documents of the company to ensure the integrity of these documents and not tampering.

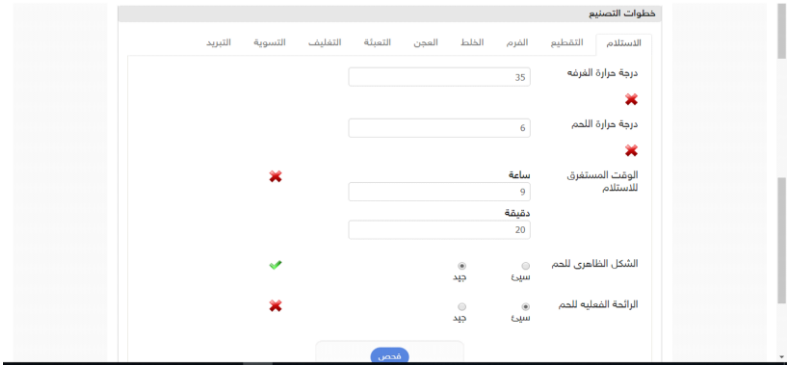
Importance of this screen, is confirmed certainty of the authenticity of the company's documents, and detecting any fraud in it immediately.



**Screen (6): Cleaning Inspection Screen**

Through this screen the inspectors report the cleaning status of al company places and production devices, this is done by a systematic method through this screen and locate each item must be sure from its clean, in a simple manner method for the inspectors.

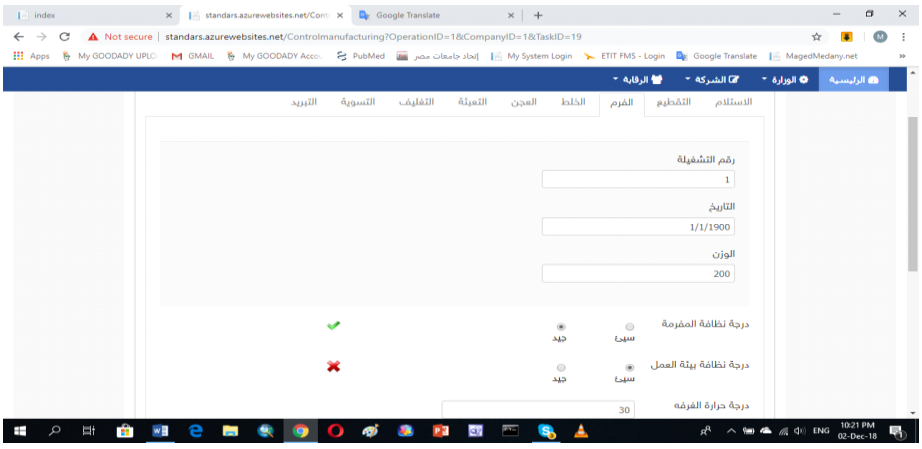
Importance of this screen, it's guide the inspectors during the mission to insure that inspection of all "places" and "manufacture devices" which must be sure from its cleanse without forgetting any place or device, so thus complete the task as a perfect way.




**Screen (7): Raw Materials Receiving Inspection Screen**

This screen contains the data for the process of receiving the raw materials (in this system we will apply the meat – as one of the raw material), then the inspector will enter all the data that he actually sees which are relevant to this step of manufacturing process like (temperature of the working room, meat temperature, duration of receiving, phenomenon of the meet - the actual smell of the meet...).

Importance of this screen, it supposed to be the main guide to the inspector during his inspection duty in the step of receiving the raw materials, then the system compares it by the HACCP upper and lower limits, and give the inspector the result if there is something wrong or not and automatically take the decision, and report it.

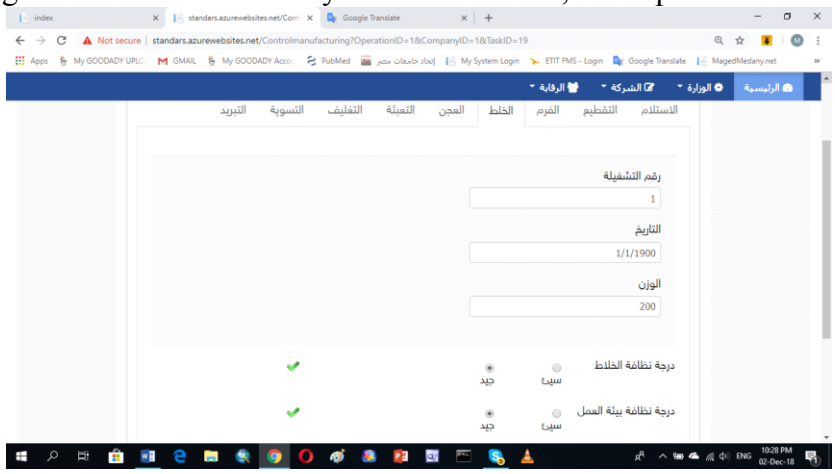



**Screen No. (8): Meat Chop Inspection Screen**

This screen contains the data for the process of meet chopping step, then the inspector will enter all the data that he actually sees which are relevant to this step of manufacturing process like (patch number – start date and time – weight- cleanse of the chop devices - cleanse of the work environment - etc..).

Importance of this screen, it supposed to be the main guide to the inspector during his inspection duty in the step of chopping meet, then the system compares it by

the HACCP upper and lower limits, and give the inspector the result if there is something wrong or not and automatically take the decision, and report it.

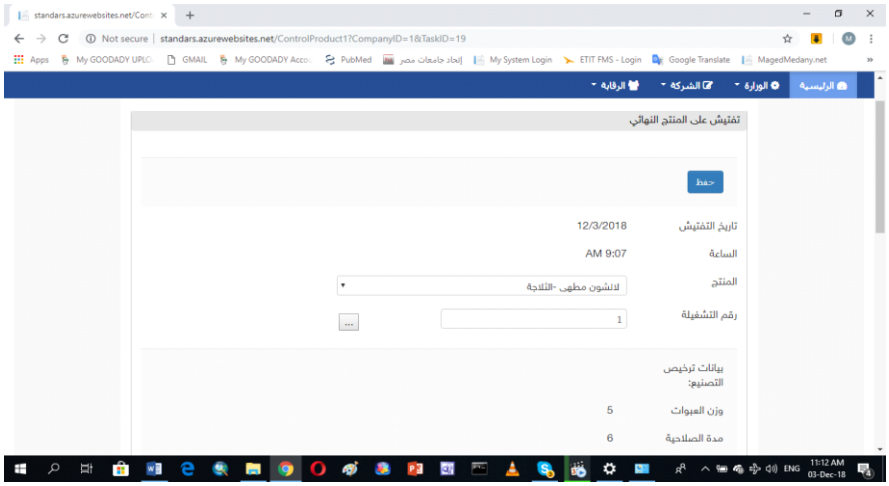



**Screen No. (9): Mixing Materials Inspection Screen**

This screen contains the data for the process of mixing materials step, then the inspector will enter all the data that he actually sees which are relevant to this step of manufacturing process like (patch number – start date and time – weight- cleanse of the mixing devices - cleanse of the work environment).

Importance of this screen, it supposed to be the main guide to the inspector during his inspection duty in the step of mixing materials, then the system compares it by the HACCP upper and lower limits, and give the inspector the result if there is something wrong or not and automatically take the decision, and report it.

The rest of the system screens for manufacturing inspection steps, (Packing process - heating process - cooling process) are designed in the same manner and based on the minimum and maximum calibrations limits of the HACCP system, and have the same benefit for the inspectors.

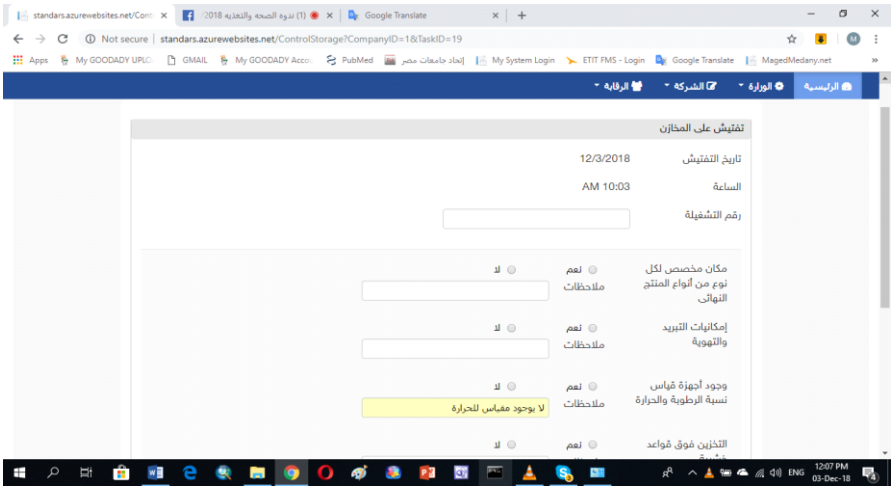



**Screen No. (10): Final Product Inspection Screen**

This screen data for the process "inspect of the final product" divided into two parts, the first part is to view the data of the original product on which a formal declaration was taken and which the factory is supposed to comply with, like (Product type - Batch number - Manufacturing license data - Package weight - Expiration date - Percentage of product components), the second part is which the inspector enter all the

data that he actually sees which are relevant to this step like (patch number – start date and time – weight- cleanse of the mixing devices - cleanse of the work environment).

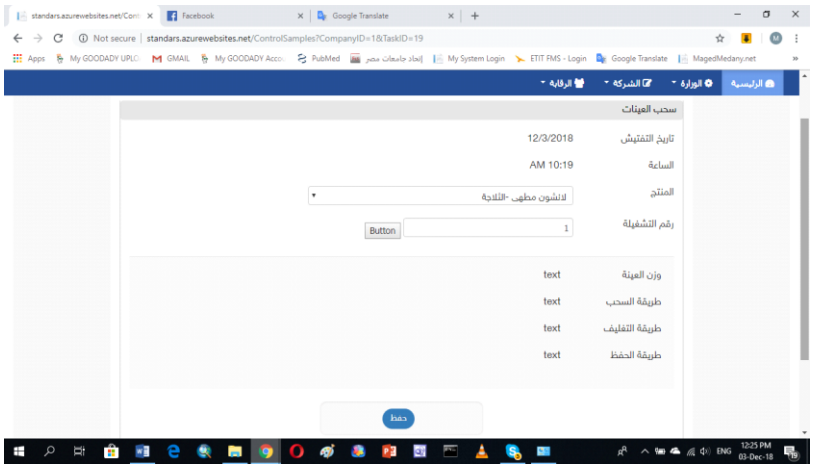
Importance of this screen, it supposed to be the main guide to the inspector during his inspection duty in the step of inspect of the final product, then the system compares it by the HACCP upper and lower limits, and give the inspector the result if there is something wrong or not and automatically take the decision, and report it.




**Screen No. (11): Stores Inspection Screen**

This screen contains the data for the company stores inspection, which the inspector record data about (Separate Place for each product type - Good cooling and ventilation devices - Humidity and temperature measuring devices - Storage above wooden bases - Clear product data).

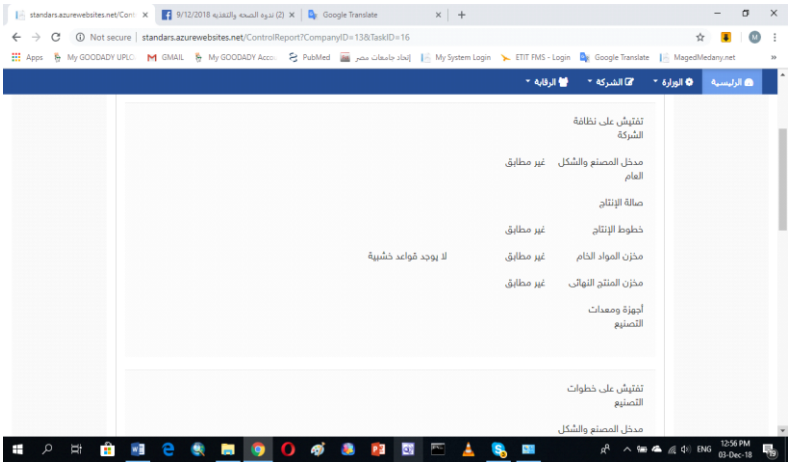
Importance of this screen, it supposed to be the main guide to the inspector during his inspection duty in the step of inspect of the company stores inspection, then the system compares it by the HACCP upper and lower limits, and give the inspector the result if there is something wrong or not and automatically take the decision, and report it.




**Screen No. (12): Sampling Screen**

This screen contains all the data that helps the inspector in sampling process in a proper manner, which helps in providing information on sampling method of each type of samples and its conservation.

Importance of this screen is to standardize the sampling method for all in the same way to achieve justice among all companies and ensure the withdrawal of samples and stored in a sound manner to obtain real results of specialized analyzes to reach the right decision.




**Screen No. (13): Create Reports Screen**

## CONCLUSION:

From this study it can be conducted that, Quality and hygienic levels together with the price of food/feed materials can reflect to same extent its safety condition, there is an inverse relationship between the total bacterial count and sodium nitrite concentration in same food materials and quality control programs such as HACCAP must be applied and used in food/feed processing and handling activity to assure its safety and compliance with official regulation.

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