Evaluation of Thai Precooked Frozen Meals Presented at Hajj Season 1435 H

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Abstract

Food is preserved against contamination, physical, chemical and biological changes. Freezing is one of the preserving methods that inhibits the growth of microorganisms which cause spoilage and food borne illness. Thai meal Manufacturers used freezing method to preserve cooked meals presented to Thai pilgrims during Hajj season 1435 in Mina camps. The meal is heated in water bath and then served with rice. Food safety follow-up at a rate of three rebounds per meal was conducted: the preparation, cooking, packaging and presentation. Temperature study was done for the meal in its various stages. A random panel test was conducted to evaluate the taste, flavor, texture and overall acceptability of food provided and the degree of meal temperature. The study found that the frozen meal is easy to prepare, safe, clean and less likely to be contaminated. The meal was found to have good acceptance flavor, taste, texture and overall acceptability ranged between 82 and 94% of the total pilgrims who were surveyed. Some of the negative aspects of the meal taste were noticed among them: some components are not in line with the Thai taste,additionally it was difficult to differentiate between recipes due to the small fonts on carton Pack. The study came up with some recommendations that will develop and bridge the gaps that accompanied the experience.

Introduction

Food is preserved to protect it from contamination, physical, chemical and biological changes. Food is physically and chemically unstable; one of the most important methods of its preservation is freezing. The purpose of frozen storage of food is to extend its shelf life and to limit microbial and enzymatic activity which causes food deterioration (Makarios et al., 1993). Freezing is reported to be one of the easiest, quickest, most versatile and most convenient methods of preserving foods. Properly frozen foods maintain more of their original color, flavor and texture and generally have

more of their nutrients than foods preserved by other methods (Robinson, 2013). Manufacturers of Thai meals used freezing to preserve cooked meals presented to Thai pilgrims during Hajj season 1435 in Mina camps. The cooked frozen Thai meals were served to11 thousand pilgrims for 5 days, three meals per day during their stay at Mina. There were 39 different recipes that can be categorized to: Fish and seafood, vegetables, chicken, and meat; packaged in a (5Kg lightweight plastic pouches designed for heating in the microwave). The meal is heated to the boiling point by simply placing the frozen package in clean boiling water, and moisture steams the food inside plastic pouch in one simple step; heating up takes about 45-55 minutes for sea food and chicken, 35- 40 minutes for vegetables. The components of the package are poured into saucepan, distributed to seven dishes and then served with steamed rice in a single use aluminum foil dish. The food safety practice during delivery of raw materials, storage, preparation and packaging, presentation was controlled by focusing on hazardous points namely: personal hygiene, temperature control and cross contamination control. It is important to prevent temperature fluctuations during transportation and storage, and to avoid thawing and re-freezing, to maintain the quality of frozen food (Boonsumrej, et al, 2007). Overall quality and shelf life of frozen food is the composite result of the above concurrently occurring actions the rates of which depend on storage temperature. It is important to test food taker response to food composition, sensory evaluation measures to what extend is the food accepted or needs to be improved. However, the objectives of the current study are:

1- To study the meal temperature throughout the different stages (receiving, storage, cooking, packaging and presentation);

2- Sensory evaluation to determine the Thai pilgrims' acceptance of the meals;

3- To discuss the advantages and disadvantages of the experiment.

Materials and Methods

Thermal test

A food thermometer was used to measure meal temperature according to method described by (USDA, 2011). The thickness of the probe was approximately 1/ 8 of an inch and took about 10 seconds to register the temperature on the digital display. Since the semiconductor is in the tip, thermistors can measure temperature in thin foods, as well as thick foods. Because the center of a food is usually cooler than the outer surface, the tip was placed in the center thickest part of the food and was held until a constant temperature was maintained. The test was performed to meals on delivery and after 3 and 6 hours of receipt and after cooking and packaging and when presented to pilgrims.

Food safety control

A check list for good health and good manufacturing practice was used to follow-up procedures of food safety was done at a rate of three rounds per meal covering the preparation, cooking, packaging and presentation (Plate1). The follow up concentrated in cleanliness, hand washing, wearing of personal protection equipment (PPE) and uniform. The previously listed points focuses on over 100 elements, which have been checked per round.

Questionnaire and Sensory evaluation

A questionnaire was presented to some pilgrims (about 200), who were questioned in order to detect their general acceptance and sensory evaluation of the presented meals, including: if the pilgrim was familiar with the presented meal, general acceptance, taste, flavor, texture and meal temperature. The questionnaire also contained other personal information: age, sex, education, and frequency of coming to Hajj. Observations and recommendations of pilgrims were recorded.

Observations

Negative and positive observations were extracted from pilgrims' observations, food safety officers and camps mangers. The advantages and disadvantages were set according to food safety , negative environmental impact of the meal in form of waste and losses, reliability and acceptance.

Results and discussion

Meal temperature

The temperature test of the meal at the different stages of handling is presented on Table1. Temperature and time are critical points when we deal with food handling and serving from the obtained results the temperature zone of cooked meal was maintained according to (USDA, 2011) which recommended minimally 60°C for hot foods. The average time between packing and serving was ranged between15 and 65 minutes which falls in the time recommended by (USDA, 2011). The temperature of the frozen meal at delivery was found to be between -14 and -17°C, which is less than the recommended temperature for frozen foods; as there were no room or power source in Mina site for keeping 3000 Kg of frozen meal nor refrigerators for melting, the meal was kept at room temperature for 6 hours before reheating.

Table 1: Meal temperature at different stages of handling

Meal	At receipt	After 3hrs	After 6hrs	After cooking	After packing
Rice	-	-	-	94	73
Vegetables	-14	- 11	-6	92	71
Sea food	-17	-11	-5	87	69
Octopus	- 15	-10	-6	91	68
Fish	-16	-9	-4	93	70
Chicken	-15	-10	-5	89	69

Food safety

Throughout the auditing using the check list accredited by the local health authorities of Holy Makkah, only minor errors were detected by the food safety officers, these good results might be due to the good intensive training given to the working staff, and for the close follow up and advices offered by the food safety officers.

Questionnaire and sensory evaluation

All of the respondents were familiar with the presented meals. This finding implies that frozen Thai meal presented kept the original general features of the fresh meals, this fact was stated by (Makarios et al., 1993) who reported that the proper frozen food retains most of its characteristics when cocked or heated. Meal taste evaluation resulted in 39% good, 55% moderate and only 5% of the respondent did not like the meal and rated it as bad (Fig.1), however the overall taste evaluation was acceptable . Regarding the flavor and texture the preferences of pilgrims were close to each other as illustrated in (Fig. 2 and Fig. 3) respectively, only 17% and 15% of the respondents evaluated the texture and flavor as bad, respectively. According to this finding the meal flavor and texture were accepted by over 84% of the Thai pilgrims. For the meal temperature 39% of the pilgrims felt the meal was hot while 55% of them felt it was moderate hot, only 6% felt the meal was cold (Fig. 4). However, the time between packing the meal and delivering it to pilgrim ranged between 15 and 35 minutes, this time falls in the range of the 2hrs of using the food after cooking recommended by (USDA, 2011) and many other food safety institutions like KSA ministry of health.

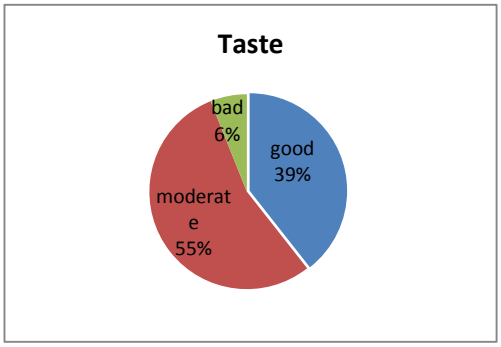


Fig: 1

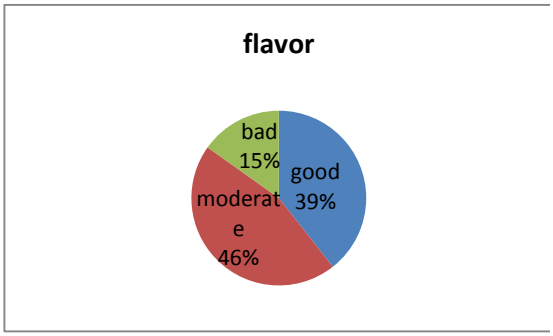
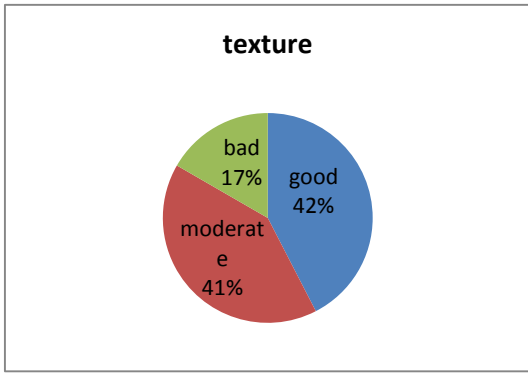


Fig: 2



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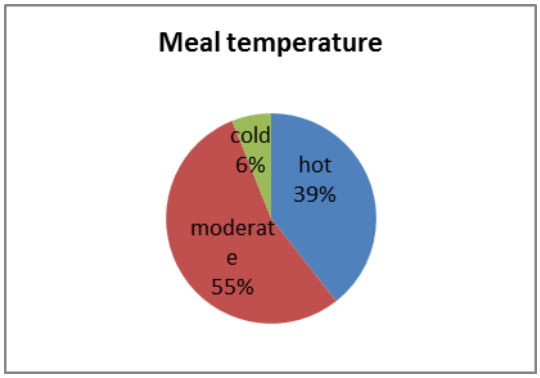

Fig: 4

Plate: 1

Plate: 2

Advantages

1- Ease and speed of preparation.

2- Clean and less likely to be contaminated and cross contamination risks is very low.

3- National food for Thai pilgrims.

4- High nutritional value, seafood is increasingly recognized as a healthy dietary component by consumers worldwide, offering high quality protein, omega-3 fatty acids, essential micronutrients and minerals. (Iwamoto et al., 2010).

5- The excess bags can be refrozen and reused.

6- Two layers of packing bags are excellent protection from damage.

7- There is a diversity of recipes (39) different recipes; three recipes were served per meal.

8- There is no local component added, which reduces the risk of contamination.

9- The refuse is limited to carton and plastic bags only.

10- Chiefs of the three camps under study were of Thai roots

Disadvantages

1- Intensity of the spicy taste of some meals is not belonging to Thai taste; Furthermore sugar was added to some recipes which go with Indonesian taste.

2- The packaging carton is weak as it holds three plastic bags 5Kg each.

3- It was very difficult to differentiate between the carton packs' contents the pack content was written with small font (Plate2).

Conclusions and recommendations

Recent years have seen tremendous advances in food technology, including improvements in industrial process, food safety monitoring techniques and nutritional quality. Among these efforts is food freezing technology which contributed to the welfare of human. It can be concluded that the experiment of serving precooked Thai meals in Mina camps was very successful: ease of preparation, safety monitoring, nutritional value and pilgrims' acceptance were fair enough to recommend the experiment to be applied in the future hajj seasons and to apply the experience in other Asian nationalities.

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