APPLICATION OF FOOD SAFETY MANAGEMENT SYSTEM DURING WHEAT FLOUR MILLING AND PROCESSING

By

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B.Sc. Agric. Sc. (Food Science and Technology), Ain Shams University, 1998

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ABSTRACT

Medhat Mohamed EL-Bayoumi Ahmed: Application of Food Safety Management System During Wheat Flour Milling and Processing. Unpublished Ph.D. Thesis, Department of Food Science, Faculty of Agriculture, Ain Shams University, 2015.

Food safety management system is a systematic method that serves as the foundation for assuring food safety in the modern world. This system was designed to be used to prevent the occurrence of food borne hazards from the first point of production chain through manufacturing, storage to the end user and his satisfaction.

The purpose of the present work was to pay increase attention to wheat grain and wheat flour quality by implementation of food safety management system by applying ISO 22000 and HACCP as a safety tools in wheat milling industry, from receiving wheat grains to produce their product (flour streams).

Checklists for prerequisite programs (PRP) in wheat milling processing line were obtained and results of hygienic principles were as follows: Total viable count of swabs from hands of plant workers ranged from 3.00 to 1.50 log cfu/swab during the investigation period of autumn, where it was from 2.00 to 1.48 log cfu/swab during spring period. In the same time, counts of moulds ranged from 2.13 to 1.00 and from 1.54 log cfu/swab to < 9 during the aforementioned investigation periods, respectively.

On the other hand chemical composition and microbiological analysis for water which used in wheat grain conditioning were obtained and its results were <1 cfu/ml for coliform group; fecal streptococci as well as *E.coli* and it was in consistence with the governmental regulation. PH-value was 7.55 for autumn season and 7.05 for spring season, otherwise, total dissolved solids were 476 mg/L and 460 mg/L for autumn season and spring season respectively.

Equilibrium moisture contents of wheat grains and wheat flour as well as its streams were obtained and the results were varied from 0.0237 to 0.1637 g H_2O / g DM for wheat grain and from 0.0685 to 0.20 g H_2O / g DM for wheat flour the water activity range from 0.11 to 0.85 at $21 \pm 3\ ^{O}C$. The sorption isotherms curves of wheat grain and flour streams could be presented well by the sorption models of Henderson and GAB. Value of the monolayer moisture contents were calculated by BET-equation

Hazards identification and determination of acceptable levels for wheat grains and its products were obtained which were represented in chemical, physical as well as microbiological hazard. In this study,Preparation for milling as well as flour sieving considered as CCP1 and CCP2, respectively.

The CCP1 (preparation to milling) represent the sifting process and metal detector step for the hydrated grains transported through conveyers from storage silos to the mill. The hazards in CCP1 are the presence of insects, insect's eggs as well as physical hazards.

The results of heavy metals as a chemical hazard were less than 0.01 ppm for Pb; As; Hg and Cd. On the other hand, results of pesticide residue for wheat grain appeared in this study were chlorapyrifose 0.15 ppm; Diazinon 0.01 ppm; Malaathione 0.044 ppm and trizophorase 0.015 which represent fungicides and rust but it didn't appeared in the end products (flour).

RESULTS AND DISCUSSION

Results of microbiological analysis of wheat grains during autumn contained 4.85, 2.72, 2.10, 1.89 and 4.69 log cfu/g for total plate count and counts of moulds, aerobic and anaerobic spore forming bacteria and coliform group, respectively. Otherwise It could be noticed that wheat flour, after different milling steps had a microbiological load of 4.30, 3.63, 2.10, 1.58 and 2.53 log cfu/g for total viable count and counts of moulds, aerobic & anaerobic spore forming bacteria and coliform group, respectively during autumn seasons.

The microbiological load of tested wheat flour for the aforementioned microbiological criteria were 4.17, 2.45, 1.89, 1.22 and 1.80 log cfu/g, respectively during the spring seasons.

The variation in microbiological load of wheat flour in comparison to wheat grains showed that, wheat flour had generally microbiological load lower than that of wheat grains, especially in anaerobic spore forming bacteria and coliform group, which could be attributed to the effect of milling process and its steps, such as cleaning and hydration steps, on reduction of the microbiological load of grains. In the same time, the results of pathogenic bacteria *e.g Bacillus. cereus, Staphylococcus .aureus* and *Escherichia coli* had the same trend.

Key Words: wheat,flour**,**Equilibrium moisture content, sorption isotherms, HACCP,ISO 22000

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CONTENTS

LIST OF TABLES