

# A Survey on the Sanitary Condition of Kitchens of School Lunch Program

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## Abstract

A survey was conducted to investigate the sanitary condition of school kitchens in one region of Korea. A self-administered questionnaire recommended by the Korea Ministry of Education & Human Resources Development (MOEHRD) was offered to a random sample of dieticians of twenty-five elementary schools for food, sanitation and safety inspection of their kitchens. Air temperature, relative humidity, and airborne microbes in the kitchens were monitored during food preparation, processing and service. The inspection results showed their sanitary condition met the level B of the recommendation of the Korea MOEHRD. The range of air temperature of the kitchens was 21.4~22.4°C, and the range of relative humidity was 62.4~69.6%. The microbiological evaluation of kitchen samples indicated aerobic plate count levels from 22.5 to 26.5 CFU/15 min. These results indicate that the levels of sanitary condition of kitchens in the schools were not satisfactory for safe foodservice although the inspection showed good results. This study suggests that the school kitchens should be monitored and strict inspection is necessary.

**Keywords:** School lunch program, kitchens, inspection, temperature, humidity, airborne microbes

## Introduction

The School Lunch Program is available to 90.7% of elementary school children, 56.8% of middle school students, and 64.3% of high school students in Korea. The outbreaks of foodborne diseases associated with the school lunch program are increasing in Korea. However, there are only a few reports on the contamination of foods or sanitary condition of cooking area of school lunch program. This study was performed to investigate the sanitary condition of kitchens of school lunch program and to prepare background data for improving the safety of school meals.

## **Materials and Methods**

Food, sanitation, and safety inspection, checking of air temperature and relative humidity, and detection of airborne microbes were conducted at the kitchens of twenty-five elementary schools in one region of Korea. The surveys were carried out over a two-month period (September- October, 2001). The Korea MOEHRD has a form (questionnaire for Food, Sanitation & Safety Inspection), which is used during the inspection of school foodservice facilities. It refers to safety structures of kitchen, cleanliness and sanitation of equipment and utensils, good personnel hygiene of employees, raw materials and their adequate storage, appropriate procedures of cooking, good environmental sanitation, implementation of HACCP, and safety control. This form was used as a tool to inspect the school kitchens each of which was used by more than 300 people (370~1448). The dieticians of the schools, who are in charge of the responsibilities of sanitation management of, completed the questionnaires by themselves. Air temperature, relative humidity, and airborne microbes of the kitchens were checked five times a day during the food preparation, processing, and service. In/out thermo-hygrometers (Sanyo, Japan) were used to monitor temperature and humidity. Airborne microbes were sampled on sterilized standard plate count agar in Petri plates at five food preparation sites in school kitchens. The plates were refrigerated immediately and carried to the laboratory (at temperatures between 0°C and 4°C in an ice box) and examined within 2 hours of sampling. Aerobic plate counts at 32°C for 48 hours were determined on the standard plate count agar, as suggested by the Korea MOEHRD. This was followed by enumeration of bacteria using a colony counter.

## **Results and Discussion**

The completed questionnaires showed that the mean value of food inspection was 89.3 (range 81~97). According to the recommendation of Korea MOEHRD, the inspection result with the questionnaire is classified five categories (A, B, C, D, and E). The mean value of the results of this survey meets the B level. The air temperature range of the kitchens was 21.4~22.4°C. This temperature range is available for the growth of mesophile and sometimes for the growth of psychrophile. The air temperature of the kitchens significantly increased during the processing compared to the starting point ( $p<0.05$ ). Checking the temperature of food preparation area has a practical value, since high temperature or temperature fluctuations during food preparation, processing, and service should be avoided. The relative humidity range of the kitchens was 62.4~69.6%. The relative humidity significantly increased 1 hour after starting point ( $p<0.05$ ), and this was maintained until the end of the monitoring. All the kitchens studied were adequately ventilated in the inspection. However most of the visits, excess humidity and vapor condensation were observed during the preparation and processing

of food, because ventilation facilities were insufficient in the kitchens. The aerobic plate count levels of the kitchens were 22.5~26.5 CFU/15min. These levels are not higher compared with the data from Jones (1998), which showed 40% of sixty home kitchen sites had below 2 log<sub>10</sub> CFU of total viable count. However, further microbiological examination, especially for pathogenic microorganism should be carried in any other samples in the kitchens.

## Conclusions

The use of a questionnaire for the food, sanitation and safety inspection indicated that the sanitary condition of school kitchens was at a higher level although it did not meet A, the top level. However, the results of monitoring of air temperature, relative humidity, and airborne microbes for checking the sanitary condition of school kitchens were not satisfactory. These results demonstrate that the most of dieticians of the schools are satisfied with the sanitary condition of their kitchens, therefore it is suggested that their attitude should be changed because dieticians play a substantial role in preventing foodborne diseases.

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