

**THE PROVISION OF QUALITY AND SAFE FOODS IN
SCHOOL LUNCH PROGRAM THROUGH
CENTRALIZED FOOD PRODUCTION TECHNOLOGIES**

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ABSTRACT

Sound nutrition is the basic foundation for the health of a population. Proper nutrition education through the school system can actualize the building of sound nutrition practices from childhood to adult life. Assurance of safe and nutritious meals being provided at school lunch programs along with nutrition education can have far reaching impact to the health of the whole nation.

In Hong Kong, the recent change over from a half day to full day school program signaled the need for a school lunch program. However, there has been no organized effort so far in Hong Kong to provide such service. School lunches are being provided by caterers who are more concerned about profits than food safety. Alarming rates of food poisoning occurring recently in Taiwan schools has further accentuated the importance of food safety.

With the advent of centralized food production technologies, Dietitians can apply their nutrition knowledge and integrate with food production processes such that safe, healthy and nutritious meals can be produced in large quantities in a cost-effective manner serving the needs of the school children.

This paper introduces the centralized food production concept, using some of the cook chill production centers for school lunch programs in the United States as examples to discuss how new technologies and management system can be integrated to yield the best outcome in food quality and safety.

INTRODUCTION

The basic foundation for good health is sound nutrition. Awareness and promotion of sound nutrition needs to start at the beginning of life cycle. There is no better place than at a school setting where children can enjoy a nutritious meal and at the same time learn and taste what good nutrition is all about. Furthermore, proper nutrition is a prerequisite for successful learning, therefore the provision of safe and nutritious meals at school lunch programs are of ultimate importance to the future health and development of our citizens. At present, school lunches are often catered by commercial businesses whose ultimate goal is profit and not safety let alone good nutrition. Alarming rates of food poisoning cases in school meals have been reported in Taiwan, China and Hong Kong. With the advent of cook chill centralized food production technologies, dietitians can apply their nutrition knowledge and integrate with food production processes such that safe, healthy and nutritious meals can be produced in large quantities in a cost-effective manner serving the needs of the school children.

CENTRALIZED FOOD PRODUCTION CONCEPT USING COOK CHILL TECHNOLOGIES

Chilled food systems for which the intent is to hold cooked food cold for later service are not new. Since the early 1900s mechanical refrigeration has been used for cold food storage. However, there are quality and safety problems any time food is held for later use. These problems have been addressed by food microbiologists and chemists for many years and researchers were finding ways to preserve cooked foods in low temperatures. In 1950s, airline catering pioneered an alternate strategy

of cook, chill, package and hold for later use to the traditional manner of food preparation (Snyder, 1992). At present, cook chill is preferred over cook freeze because cook-chill is more energy efficient and it can attain a better quality and product. The whole concept of cook chill is based upon the technology of lowering temperature of cooked foods very rapidly to safe cold temperature slightly above freezing point within a few hours to escape the window of opportunity for bacterial growth. Thus cooked and chilled foods can be kept up to six weeks maintaining fresh quality and safety. This technology revolutionised the whole food service concept. Cooking process can now be separated from serving, traditional kitchens can be transformed into "product line" manufacturing centres, cooking to fill an inventory rather than to immediate service and consumption. Using the central production concept, food production, can be centrally cooked and chilled, chilled foods can then be warehoused and satellited to receptor sites.

THE IMPORTANCE OF END-POINT RETHERM TO ENSURE FOOD SAFETY

Most food poisoning occurs with improper food holding temperatures. In a conventional setting, where food is cooked then held hot until service, the holding temperature and time elements are two critical control points in determining the safety of the foods. In school lunch programs, meals are often packaged hot, during which time, temperature loss occurs, up to 20 degrees Celcius. Temperature loss continues during transport even with insulated containers. By the time the "hot" meals are served to the students in schools far away from the packaging site, temperature of the meals are almost always less the specified 60 degrees Celcius guideline. As soon as food temperature falls below 60 and above 10 degrees Celcius, micro-organisms begin to multiply at a tremendous rate, this is the so called "danger zone" which food service professionals recognise and try to avoid. Therefore the only safe way of serving safe meals is to either cook right on site and serve immediately or use cook chill production technology and transport over long distance in a chilled state at less than 4 degrees Celcius then retherm on site or close to service points.

USE OF COOK CHILL TECHNOLOGY FOR SCHOOL LUNCH PROGRAMS IN THE UNITED STATES

Case 1: Montgomery County Public Schools Food and Nutrition Services Center, Rockville, Maryland (Davidson, 1997)

In 1995, Montgomery County Public Schools enrolled 117,000 students in 179 buildings. Enrolment is expected to increase to 134,000 students by the year 2001. The new central production facility eliminates four central kitchens located in various parts of the county that produced meals for Montgomery County elementary schools. It also reduces the size and operations of the secondary school kitchens because menu components will be received at the school ready to be finished and served. The new central production facility is a state-of-the-art automated food production center approved by the Board of Education in response to increasing student enrolment and the need to improve cost efficiency of food production operations.

Montgomery County Public School Commissary in Maryland serves 183 school, over 45,000 meals per day, total over 8 million meals per year, 50% of the meals are cold-platted for elementary schools while the other 50% are bulk packaged for secondary schools. There are 57 production staff, 13 truck drivers and 28 warehouse/store personnel in the food production center. The delivery trucks make 143 stops per day, travel 180,000 miles per year.

The food production facility floor area comprised of a total of 30,000 square feet, containing seven major areas related to the preparation and production of school meals prior to their short-term storage and distribution to schools: 1) The Ingredient Control Area where foods are requisitioned daily from warehouse. Recipe ingredients are weighed and measured according to production requirements. 2) The Cook Chill Area where large volume (200 gal) fully automated kettles cook soups, casseroles, stews, sauces and dessert items. Then cooked foods are immediately pumped and packaged then tumble-chilled from 85 degrees Celcius to 4 degrees Celcius in less

than 1 hour, 200 gal cook tanks are used to cook and chill 1000 kg of roast meats at one time. 3) Salad and Vegetable Preparation Area where salads such as cole slaw, potato salad etc are prepared and vacuum packaged for cold storage and distribution 4) The Bake Centre where breads and desserts such as muffins, cookies.etc are prepared as finished baked goods or semi-processed form to be bake-off at finishing sites. 5) Pre-Plate Assembly Area where individual portions of chilled entree items are assembled and packaged for cold distribution to elementary school kitchens for retherm piror to service. Various sandwiches are also assembled and wrapped in this area. 6) Product Cooler/Food Band where pre-plated meals and cook chill products in bulk packages are stored at -1 degree Celcius until delivered to schools. 7) Warewashing Area where a flight type dishwasher and a full cart pan washer sanitise equipment used in the preparation and storage of food items.

The warehouse consists of 15,000 square feet of dry storage, 6,000 square feet of frozen storage and 1,500 square feet of refrigerated storage. It receives,stores and distribute food and supplies to receptor sites in its catchment area.

The Division of Food and Nutrition Services at the Montgomery County Public School Commissary administers the National School Lunch and Breakfast Program, the Summer Food Service Program, the Child and Adult Care Food program and Commodity Distribution Program. Production support activities include menu development and planning, quality control and assurance, nutritional analysis, product development, employee training, in-process food testing, and system-wide food services co-ordination. The Montgomery County Public School commissary provides health and well-balanced school meals to students and thereby ensure that they are ready to learn to the best of their abilities. The new central production facility allows the school system to offer a greater variety of healthy and creative meals to students in a cost effective manner. It is projected that by the year 2001, the new central production facility will have saved the school system more than \$21 million in food and labour cost.

Case 2: The Child Nutrition Center at Long Beach Unified School District, Long Beach, California.
(Townsend, 1996)

The school system's previous central kitchen was built in 1947 and had not been updated since 1955. Not only was it seriously outdated, it did not have the capacity to handle the production demand from 81 elementary, middle and high schools, 32 child-care centers and 16 Head Start centers, a tremendous student enrolment growth in the last five decades (Townsend,1996). The new Child Nutrition Center took over the site of a formal department store warehouse of 142,000 square feet. It now contains a large cook chill production facility, complete with bakery, huge storage and excess capacity for future growth. The center piece of the new production site is a new cook chill system that takes the food production capacity to a current 73,000 meals per day to 100,000 meals per day in the future.

The Food Storage area consists of 24,000 square feet of walk-in freezer space and 10,000 square feet of walk-in refrigerated space plus dry storage. Similar to Montgomery County site, an ingredient control room is located between the storage areas and the production kitchen. The cook chill equipment consists of four 200-galon mixer kettles and two 200-galon pasta kettles. This combination ensures meeting all production needs with only one shift. Five days per week. After cooking, food is pumped from the kettles via mobile pump stations into flexible plastic casings. The filled bags are sealed with clips and then chilled in a tumble chiller, then stored in a refrigerated food bank. Apart from the main production area, the kitchen's bakery features four bake/roast rotary rack ovens, where a wide variety of bakery items are prepared for distribution. Some, in fact, are bulk prepared and distributed to satellite sites for finishing such as cake batter.

The pay-off for volume production is in savings of labour and food product. At Long Beach, large lot purchasing and reduced vendor prepared items have saved more than \$500,000 on an annual basis. Furthermore to dollar savings, administration has gained as well. Now, everything-including cooking, purchasing, receiving, hiring and planning - is located under one roof. By using cook chill technology, Long

Beach district's commissary has made a quantum leap forward for a growing school system.

Two examples have been cited above to illustrate the extent of application in using cook chill technology to supply school meats. There is no doubt that centralised food production concept using such technology can increase productivity, improve product quality and consistency and reduce cost. However, implementation of any new technology needs to be accompanied with the right skills in order to achieve the ultimate goal of quality and efficiency. Cook chill is a relatively new production concept in Asia. If we are to embrace this new technology and apply it in our school lunch programs, how do we get ourselves prepared for it? What is the impact of this technological change to the core competencies of our food service professionals? This technological change means that we must be thoroughly trained in basic food science and technology, including microbiology, food chemistry, food formulation, food nutrition and food engineering. This knowledge base coupled with operational knowledge of the new technology and equipment used is essential to ensure that processed food is safe, yet not over-processed, and at the same time to maximise nutrient retention in order to meet the increasing demand for food quality and safety. Equally, the understanding of manufacturing concept in terms of product safety, inspection standardisation, packaging is just as important. Dietitians, food service managers and supervisors will need to equip themselves with the skills and knowledge in equipment and food service operation, facility layout and planning in relationship to the new technology. Computerised food service management system is mandatory for the operation to run effectively. Operators will benefit from the use of information technology to assist in food production forecast and scheduling, inventory, cost control, food purchasing, recipe standardisation and nutrient analysis. Furthermore, information system can generate management reports for workload and performance review and analysis. System can also link with satellite sites and vendors for direct order and shipment.

Food safety is a major concern especially in cook chill operations, time and temperature are critical control points, along with equipment cleaning and staff hygiene. Implementation of a HACCP program is essential to safeguard food safety.

Furthermore a systematic approach to food service management is key to a successful operation. Using a good international standard such as ISO 9000, one can set out the methods by which a management system, incorporating all the activities associated with quality can be implemented in an organisation to ensure that all the specified performance requirements and the needs of the customers are fully met.

CONCLUSION

The application of cook chill technology in school lunch programs has been cited in two US examples. At present there has been no organised effort to provide safe and nutritious school meals in Hong Kong. School meals are supplied by caterers who are more concerned about profit than food safety. Where there is no school lunch program, children are left with the option to purchase from street vendors where sanitation is often a major concern let alone good nutrition. Dietitians in Asia have a major role to play in this technological change, take on the challenge to acquire such knowledge on new production technologies, take on the leadership and responsibility to develop and implement quality school lunch programs so that safe, healthy and nutritious meals can be produced in large quantities in a cost-effective manner serving the needs of the school children and our society. The health and well-being of our future generation is in our hands.

BIBLIOGRAPHY CITED

1. Davidson J The Food and Nutrition Services Center 1997.
<http://meps.k12.md.us/departments/foodserv/fncs.html> 1998/5/19 PM 05:58
2. Snyder, O.P. developing A Total Quality Management Based Food Safety Program For A Chilled Food System Cleveland Range Lnc Cleveland, Ohio 44110 U.S.A. 1992
3. Townsend R. New School Commissary Access Test Foodservice Equipment & Supplies Specialist April 1996.