To the Graduate Council:

I am submitting herewith a thesis written by Todd Michael Kirkpatrick entitled "Foodservice conditions in licensed urban and rural child care centers: An application of the *National Health and Safety Performance Standards*." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

Dr. Betsy Haughton, Major Professor

We have read this thesis
and recommend its acceptance:

Accepted for the Council:

Associate Vice Chancellor and
Dean of the Graduate School

Foodservice Conditions in Licensed Urban and Rural Child Care Centers: An Application of the *National Health and Safety Performance Standards*

A Thesis

Presented for the

Master of Science Degree

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DEDICATION

This thesis is dedicated to my mom, dad and Grandfather, Mr. Charles Kirkpatrick, and in memory of my Grandmother, Mrs. Charles Kirkpatrick, and Grandparents, Mr. and Mrs. Edward Borden. They have shown me that hardwork and dedication are the foundation for any successful journey and when the chips are down, look to your family, because they will always be there to support you. Thank you for being excellent role models and sharing your wealth of wisdom. God bless each of you.

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ABSTRACT

Objectives: To assess the degree to which child care centers in urban and rural counties met foodservice standards as documented in the *National Health and Safety Performance Standards*; to determine if a difference in foodservice conditions existed between these two groups; to determine if the foodservice conditions at child care centers are related to the directors' perception of existing foodservice conditions or the importance of maintaining safe foodservice conditions, or previous environmental health inspection scores; to identify child care staff training needs.

Subjects: 36 urban and 34 rural child care centers in east Tennessee

Design: On-site assessment of food production facilities and interviews with food production staff members and center directors

Statistical Analysis: Multivariate and analysis of variance were used to detect differences for assessed foodservice conditions, while Pearson Correlation described relationships. Frequencies were used to identify the training topics most requested by directors.

Results: There was no significant difference ($F=0.00$; $p=0.9516$) in the assessed foodservice conditions between urban (80.9 ± 4.8) and rural (80.8 ± 6.9) centers. A statistically significant difference ($F=4.40$; $p=0.0397$) was detected in the safe food storage sub-topic between rural (70.8 ± 12.5) and urban (65.1 ± 10.2) centers. Since assumptions for parametric tests were not met, a correlation could not be done between the assessed foodservice conditions and the directors' perception of the importance of

maintaining safe foodservice conditions. There was a statistically significant ($F=10.47$; $p<0.0001$) difference in assessed foodservice conditions between directors who perceived foodservice conditions to be excellent (83.9 ± 4.4) and directors who perceived them to be very good (78.5 ± 6.3) or average (77.8 ± 4.9). There was no statistically significant relationship between the assessed foodservice conditions and environmental health inspection scores ($r=-0.14$; $p=0.4163$). A majority of the directors (88.6%) believed there was a need for training that addressed safe foodservice practices; in particular safe food storage (90.0%), kitchen safety (87.1%) and chemical storage (85.7%).

Conclusions: Urban and rural centers maintain similar foodservice conditions. However, urban centers did score significantly lower than rural centers for one foodservice sub-topic, safe food storage, with a score of < 70%. The directors' perception of the existing foodservice conditions is related to the assessed conditions, although the application of this relationship is unknown. There is no statistically significant relationship between the assessed foodservice conditions and environmental health inspection scores. There is both a perceived and assessed need for foodservice training.

Applications: The *National Health and Safety Performance Standards* could be used as national standards applicable for child care centers in all 50 states. Foodservice topics in need of training include: safe food storage, kitchen safety and chemical storage.

PREFACE

To assist the reader, an explanation of the format used for this thesis is provided. The thesis consists of two parts. Part I contains an introduction, problem statement and extensive review of literature. Part II contains the actual study written in journal style.

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PART I

INTRODUCTION, PURPOSE and REVIEW OF LITERATURE

INTRODUCTION and PURPOSE

From 1976 to 1990 the number of child care centers in America tripled in response to the growing number of children needing care as their mothers entered the workforce (1). This tremendous growth increased the workload of agencies responsible for regulating the facilities, adding to the existing problems of insufficient personnel and time (2). With regulatory agencies overwhelmed, the potential for child care centers to operate without meeting the enforced standards of care is increased.

One regulatory agency that has experienced increasing workloads is the local health department, the agency that performs foodservice inspections. If centers do not maintain safe foodservice conditions, the potential for occurrence of foodborne disease outbreaks increases. Studies conducted in North Carolina and Texas and on military bases across the nation found foodservice conditions to be suspect and in need of further attention (3-5). While the results of these studies are similar, comparing the results is inappropriate because the basis on which the conclusions were made may differ. Foodservice standards specifically for child care centers may differ from region to region, because there are no nationally recognized standards for child care centers. The Food and Drug Administration has prepared a model food code applicable for all foodservice establishments, which states can use in developing standards for health inspections. However, adopting this code is not mandatory (6).

In 1992 the American Public Health Association and the American Academy of Pediatrics together produced the *National Health and Safety Performance Standards: Guidelines for Out-of-Home Child Care Programs*, which included standards for foodservice (7). Although the standards contained in this publication have not been adopted by states, they do represent a foundation for assessing centers from different regions and allow comparisons to be made. If these assessments identified areas in need

of additional training, then interventions could be developed to correct the identified problems.

Several studies have addressed the role that staff training may have on the foodservice conditions of a child care center (8-11). Each of the studies concluded that a lack of training is an important variable affecting foodservice conditions and that additional training could impact positively on the identified problems. However, none of these studies identified specific issues within foodservice that should be addressed by training.

The first purpose of this study was to create a method for assessing child care centers using the *National Health and Safety Performance Standards* for foodservice. In completing the center assessments, specific foodservice issues that are in need of additional attention would be identified. The second purpose was to measure the impact of the center directors' perceptions on foodservice conditions. The center director is responsible indirectly for the foodservice conditions, as he/she hires and trains staff and writes protocols that relate to food production. Agencies responsible for assuring that safe foodservice conditions are met in child care facilities could use the findings from this study to guide their efforts.

REVIEW OF LITERATURE

Child Care Industry Growth

Current population studies indicate the prevalence of the "traditional family," where dad works and mom stays home, has decreased from 40% in 1969 to 18% in 1993 (12). Two mechanisms responsible for the movement of mothers from the home into the workforce are: an increase in the number of single parent families and an increase in the number of dual income families. The most recent data available from the U.S. Department of Labor indicate that there were 23 million mothers in the workforce as of March 1992, up from 13 million in March 1975 (13). Parallel to the increasing number of mothers in the workforce is the continuing growth of the child care industry. From 1976 to 1990 the number of child care centers tripled and the number of children participating in these programs quadrupled (1). In 1990, of the 22 million children under six years of age, 8 million or 36% attended some form of out-of-home child care (14). With such explosive growth in an industry that is responsible for providing social development and education to millions of children, maintaining a safe environment in all of these facilities is an issue worthy of concern.

Foodborne Disease

One aspect of a safe child care environment is safe foodservice conditions, which represents all aspects of food production from receiving to serving. The primary objective of maintaining safe foodservice conditions is to prevent the occurrence of foodborne disease. According to the most recent data available from the Centers for Disease Control and Prevention (CDC), in 1983 there were over 9 million cases of infectious foodborne disease resulting in 9,000 deaths in the United States (15). In evaluating these numbers, it must be understood that in order for a case to be

documented by the CDC, it must involve two or more people and be investigated by a state health agency. This definition of a foodborne illness does not account for individual cases or cases not reported to a state agency, indicating that the CDC data may underestimate the true occurrence of foodborne disease.

Despite the lack of more recent or accurate data, several factors support the need for continued monitoring of food handling, including but not limited to: increasing number of food products imported into the United States, declining public education regarding safe food preparation practices and continuing identification of new foodborne pathogens (15). Such monitoring is completed currently through health inspections of all facilities that handle food, which includes child care facilities. Child care facilities, however, differ because of the extent of additional monitoring which occurs regularly.

Licensing and Health Inspections

All fifty states use licensing as the means to assure that child care facilities maintain both education and safety standards. Licensing addresses all facets of a child care facility, from appropriate file maintenance to proper teacher:child ratios to fire and food safety. Foodservice conditions, monitored through regular health inspections, is one requirement within child care licensing that may vary between states. The primary facilitators of health inspections are local health departments throughout each state.

The United States Food and Drug Administration (FDA) organized a "Model Food Service Sanitation Ordinance" which sets minimums for all issues to be addressed during health inspections (6, 16). Each state has the option to adopt the FDA's plan or develop its own codes and formats. The "Model Food Service Sanitation Ordinance" serves only as a minimum; states may make standards more strict if so decided. This option leads to inconsistent regulations from state to state. Inconsistency also occurs

through varying state licensure laws, which indicate which facilities must be licensed and therefore inspected (17-18), and the time interval between health inspections.

The primary role of health inspections is to serve as a means of "quality control," not as a guarantee for absolute safety (6,19). During each inspection a broad array of subjects relating to foodservice are examined, including: food handling and storage, personal hygiene practices, equipment and utensils, lavatory facilities, solid waste management, chemical storage, pest control and facility design and maintenance (16, 20).

With the continuing growth of the child care industry, the question becomes whether or not health departments can continue to provide this means of quality control. Based on time study data, the Inspector General's Office concluded that health inspectors' workloads are twice the recommended level (2). This imbalance indicates that health departments' ability to provide quality assurance may be compromised. This compromise could lead to reduced monitoring of foodservice facilities and increased numbers of facilities not operating within the standards. In order to document that foodservice facilities, such as child care centers, are or are not maintaining safe standards, on-site evaluations, similar to health department inspections, would need to be completed.

Published Standards and Guidelines

To insure that safe foodservice conditions are maintained throughout the year and not just during inspections, each child care center should have site specific standards of practice developed. These standards establish the procedures used at that center to assure that all food is prepared under safe conditions. Directors can develop these standards of practice by referring to standards developed and published by government or professional organizations.

Several states, including Texas, Wisconsin and California, have developed and published self-assessment tools or sanitary guidelines to assist child care operators in

establishing practice protocols and maintaining safe foodservice conditions (21-23). Various designs and approaches are used in the presentation of information. However, one common characteristic is the use of sub-topics within the overall topic of foodservice which allows for the inclusion of more specific recommendations and creates smaller, more manageable divisions of information. Each publication is specific for the respective state's laws and would need to be adjusted for use in other states.

One alternative to state specific standards are standards developed by professional organizations which can be used by all states for the development of site specific standards of practice. For example, the American Public Health Association and the American Academy of Pediatrics together produced the *National Health and Safety Performance Standards: Guidelines for Out-of-Home Child Care Programs* (7), through funding from the Maternal and Child Health Bureau, U.S. Department of Health and Human Services. This publication provides standards that address all issues of interest to child care providers, including but not limited to: facility design, staffing ratios, infectious diseases, record keeping and foodservice. The foodservice standards, contained in chapter four, sections six through nine, address food storage, personal hygiene and facility cleanliness with as much scrutiny as health inspections do. However, they contain more applicable, practice-oriented information than health inspection forms completed during an inspection. In this sense, the *National Health and Safety Performance Standards* provide more information which child care providers can put into practice to insure foodservice standards are always maintained.

Therefore, these standards could be used also to evaluate the foodservice conditions at a child care center, just as health inspectors use interpreted federal standards. Although some studies (3-5) have been completed using health inspection standards as the foundation, no studies utilizing the *National Health and Safety Performance Standards* have been completed to date.

Foodservice Conditions in Child Care Centers

Three published studies (3-5) have investigated the foodservice conditions of child care centers by using on-site evaluations for data collection. Domer (3) described her findings and subsequent actions taken after a visit to her child's center. The original focus of the visit was to evaluate the quality of food provided to the children and the educational opportunities available to the staff. In completing the assessment of the center the author found the foodservice conditions to be inadequate and concluded that training could alleviate some of the problems found. In response to this conclusion, foodservice training was provided for the staff and new foodservice standards were developed for the center.

A more recent study was conducted in the state of Texas (4). Site visits of nine child care centers were used to collect data regarding menus, foodservice practices and available education for staff members. Findings from the visits included: poor sanitary conditions, inadequate staff knowledge of food preparation and sanitation and insufficient educational opportunities for staff.

The 42 Child Development Centers on United States military bases were the centers in question in a 1992 study (5). On-site inspections, staff interviews and record reviews were conducted at 19 centers to assess compliance in foodservice/nutrition and health/sanitation. Foodservice/nutrition was divided into nine categories. When the results of the site inspections were stated as mean scores, two of the four lowest categories (mean <91 out of 100) were "safe, sanitary preparation of food" and "foodservice staff training."

Although these three studies together assessed only 29 centers, the results indicate that a problem regarding foodservice conditions in child care centers may exist. These

studies also concluded that staff training may be inadequate. Other studies (8-11) which assessed staff training have reached similar conclusions.

Assessment of Staff Training

A study conducted in East Oakland, California, indicated that 7 out of 16 directors of child care facilities acknowledged the need for additional nutrition education, which would include training opportunities for employees (8). Dirige et al. (9) completed a study which involved measuring the interest of child care providers in ten specific, pre-selected nutrition topics. Varying levels of interest were expressed for all ten topics; in particular, "improving food safety" was ranked seventh overall. Centers participating in a study by Bassoff and Willis (10) ranked "nutrition planning and food handling" the fourth most important training topic needed. In support of these findings were the results of a study by Pond-Smith et al. (11), which indicated that training for child care staff regarding foodservice practices was inadequate. It was stated that this lack of training may be associated with foodservice problems at child care centers. These studies provide additional data to support the need for training of child care staff to reduce the existing foodservice problems. In pooling information about foodservice practices and staff training, it becomes clear that two problems may exist: poor foodservice practices and inadequate training. Additional studies are necessary to determine if these two problems really do exist and if there is a relationship between them.

Study Design Critique

In designing future studies, the type of data collected and data collection methods used in previous studies should be assessed. The data collection methods utilized in the studies cited included mail questionnaires, used by Dirige et al. (9), Bassoff and Willis

(10) and Pond-Smith et al. (11), and face to face interviews or on-site examinations, utilized by Domer (3), Briley et al. (4), Arday et al. (5) and Chang et al. (8). According to Dillman (24), mail questionnaires can be used to gather accurate data from large homogeneous populations without excessive cost. Borg and Gall (25) recommend mail questionnaires for collection of irrefutable, absolute data. Those studies that assessed the existence of training sessions could have utilized this method.

However, those studies which involved variables measured through observation could not have used this data collection method; asking individuals responsible for the operations of the facility to report adherence to practices and standards introduces the opportunity for bias. Instead, face to face interviews or on-site examinations were chosen for these studies (3-5, 8). Face to face interviews allow for longer questionnaires and clarification in asking questions, allow the interviewer to record all visual stimuli during the interview, can reduce the occurrence of unanswered questions and can promote a high response rate (24-25). These facts support the selection of face to face or on-site data collection in studies involving assessment of practices or adherence to standards.

If a study was designed to assess both adherence to foodservice standards and availability of staff training sessions, the most appropriate method of data collection would include on-site examination in combination with face to face interviews, as suggested by Aronson and Aiken (26). This design would permit collection of data by observation and questionnaire.

Previous studies can be used not only to determine the most appropriate data collection methods to implement in future studies, but also to narrow the focus of future studies. The two studies that have assessed foodservice conditions in multiple child care centers selected centers from three different ethnic neighborhoods and from U.S. military

bases (4-5). No studies have been conducted assessing and comparing urban and rural child care centers.

Site Selection

In east Tennessee, which includes Knox County and 15 surrounding counties, there are almost 600 licensed child care facilities, including centers, group and family homes, providing care for over 26,000 children (27). Child care centers represent 95% of those facilities and provide care to over 92% of those children. Knox County, an urban county, has just under 200 child care centers with a combined enrollment of over 16,000 children. The 15 surrounding rural counties have a nearly identical number of child care centers and provide care to just over 8,000 children (27). The difference in the number of centers and the number of children receiving care in one geographical region of a state supports the selection of east Tennessee as the site for this study. Child care centers from rural and urban counties, all within the Appalachia region, can be assessed and compared without excessive travel.

Summary

In a time when the number of child care centers providing care for children of working parents is growing very rapidly, concern develops about the safety of the children attending these new centers. As for maintaining safe foodservice conditions, local health departments are responsible for providing the quality control measure, in the form of health inspections, but they may be too understaffed to perform this task effectively.

Recent studies indicate that foodservice conditions at child care centers may be inadequate, exposing the children attending these centers to increased risks of foodborne disease. Studies also have concluded that staff training of foodservice issues is

insufficient and may be one approach to improving the existing conditions at child care centers. To date no studies have been completed assessing the differences in foodservice conditions between rural and urban centers or to measure the impact of the directors' perceptions of the importance of maintaining safe foodservice conditions. Previous studies that have addressed staff training have failed to identify what specific issues within foodservice need to be addressed. With the availability of new performance standards that address foodservice, the foundation for a study to address these issues exists.

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PART II

FOODSERVICE CONDITIONS IN LICENSED URBAN AND RURAL CHILD CARE CENTERS: AN APPLICATION OF THE *NATIONAL HEALTH AND SAFETY PERFORMANCE STANDARDS*

INTRODUCTION

In the past 20 years, the child care industry has experienced unprecedented rates of growth, with no indications of cessation (1). This trend places a growing number of children in out-of-home care, where they are watched, taught and often fed by individuals skilled in providing such services. Also in recent years the number of foodborne disease cases has increased, although the number of outbreaks has decreased (2). While there are no data to suggest that the growing child care industry is related to the growing number of foodborne disease cases, concern is warranted as child care centers represent large pools of susceptible persons, congregated together in one enclosed area, sharing a common source of food. If an outbreak of foodborne disease did occur in a child care facility, the number and severity of cases could be significant.

Studies conducted in North Carolina and Texas and on military bases across the nation have found foodservice conditions to be suspect and in need of further attention (3-5). All three studies utilized on-site assessments to arrive at similar conclusions, indicating the threat of a foodborne disease outbreak in childcare is real. However, the results from these studies can not be compared for further significance because the basis on which the conclusions were made may differ.

At the present time there are no nationally recognized standards to monitor the foodservice conditions in all child care facilities. The Food and Drug Administration has written model food codes which apply to all foodservice establishments, but adoption is not mandatory (6). This allows local jurisdictions to develop regulations that apply to child care centers that may differ from other jurisdictions, leading to inconsistent regulatory standards.

In 1992 the product of joint efforts between the American Public Health Association (APHA) and the American Academy of Pediatrics (AAP) was published:

National Health and Safety Performance Standards: Guidelines for Out-of-Home Child Care Providers (7). These standards were created in response to the identified absence of national health and safety standards that could be applied to all child care providers (8). Specialists in areas of health and safety and individuals who work in child care facilities contributed to the development of these standards. This professional diversity promoted the development of standards that are realistic in content and designed for easy implementation.

While the editors of the publication clearly state in their introduction that these standards are not intended for use as "rigid criteria to evaluate the quality of the programs," (7) they could be used in identifying areas of concern that need further attention, perhaps through training. Since the *National Health and Safety Performance Standards* contain the rationale for the standards and suggestions for achieving them, if issues needing attention are identified, objectives and resources for training programs already exist.

To date no studies have been published that used the *National Health and Safety Performance Standards* relating to foodservice for assessing the conditions of child care centers and subsequently identifying areas of concern to address through interventions or regulations.

This study used the *National Health and Safety Performance Standards* relating to foodservice to assess urban and rural child care centers, identify issues that need additional attention and determine whether or not the issues differ between these two populations. This study also addressed the impact of the center directors' perceptions of the existing foodservice conditions and importance of maintaining safe foodservice conditions on the actual conditions in the food production area. Directors also were asked to identify staff training needs relating to foodservice. To determine if a

relationship existed between health inspections and the results from this study, recent health department health inspection scores were analyzed.

METHODS

Subjects

An eligible child care center was defined as a child care program licensed in the state of Tennessee by the Department of Human Services (DHS) to care for more than 13 children and that used on-site food production facilities. In August 1995 current lists of centers (9-10) in one urban county (Knox County) and seven contiguous rural counties (Anderson, Blount, Grainger, Jefferson, Loudon, Sevier, Union) were requested and received. Rural was defined as a population density < 200 persons/square mile. According to DHS there were 164 centers in the urban county and 121 in the seven rural counties. Contact by telephone was used to identify centers that used on-site food production facilities.

Data Collection Tools

Standards that address foodservice are contained in chapter four, sections six through nine, of the *National Health and Safety Performance Standards*. Two standards (NU53 and NU68) were not addressed because they relate to USDA, National Sanitation Foundation and Food and Drug Administration standards for equipment and sanitation. Two instruments were developed to assess centers' adherence to the foodservice standards: Assessment Checklist (AC) and Food Production Practices Questionnaire (FPPQ) (Appendices A-B). A third instrument, Director's Perception of Safe Foodservice Conditions (DPSFC), was developed to measure the directors' perceptions of the existing foodservice conditions, importance of maintaining safe foodservice conditions and staff training needs (Appendix C). The AC was completed by visually assessing the food production area and the FPPQ and DPSFC were completed by asking the food production staff member and center director the questions on the respective questionnaire. Food

production staff member was defined as the individual responsible for the daily production of the children's snacks and meals and center director was defined as the individual responsible for the day-to-day operations of the center (Appendix M).

The AC contained 80 questions that were collapsed into 75 items and were scored as 'yes,' (score =1), 'no,' (score =0) or 'not applicable.' This collapse of items accommodated more complex standards. Similarly, the FPPQ contained 55 questions that were collapsed into 39 items that were scored as the AC items were (Appendix D). The maximum scores for each were 75 and 39, respectively. 'Not applicable' scores subsequently were not included when calculating the foodservice sub-topics and assessed foodservice conditions scores (Appendices E-F).

Data from these two tools were combined to calculate scores for seven foodservice sub-topics and an assessed foodservice conditions score. The seven sub-topics and the respective maximum potential scores (noted in parentheses) were: quantity food production (20), handwashing/personal hygiene (9), safe food storage (30), dishware and utensils (15), chemical storage (5), kitchen cleanliness and repair (24) and kitchen safety (11). The scores for these seven topics were summed to arrive at an assessed foodservice conditions score with a maximum potential score of 114. Since the equipment and services varied between centers, the number of applicable questions varied also. Therefore raw scores for the seven sub-topics and assessed foodservice conditions score were converted to percentages of maximum potential scores to allow comparisons.

The DPSFC contained 24 questions. The first nine questions of the DPSFC were on a five point likert-like scale: one for the quality of existing foodservice conditions, one for the level of satisfaction with the existing foodservice conditions and seven for calculating a score measuring the perceived importance of maintaining safe foodservice

conditions (Appendix G). The remaining 15 questions were 'yes / no' format and related to staff training needs.

To test for a relationship between the assessed foodservice conditions score and the urban health department's Food Service Establishment Inspection Report, the three most recent environmental health inspection scores were averaged for urban centers, a calculation that accommodated for any unusually low or high scores (Appendix H). Rural centers were not included in this analysis in order to control for potential differences in health departments' implementation of standards and staff caseloads.

Pilot Test

Face validity of the AC and FPPQ were assessed by two professors in the Department of Nutrition's Hotel and Restaurant Administration division and two public health professionals from the Knox County Health Department (one Registered Dietitian and one Environmental Health Inspector). Appropriate changes were made prior to pilot testing.

The pilot test was conducted by two project team members after protocol training. Nine urban centers were selected randomly and then excluded from the population. The first two centers were used to pilot test the instruments themselves for understanding and administration. The remaining seven centers were assessed simultaneously by the project team members. Because the AC was completed visually and the FPPQ and DPSFC were completed orally, which are two distinct methods of data collection, it was necessary to calculate two reliability scores. The score for the AC was 97.0%, and for the FPPQ and DPSFC was 97.1%. The pilot test also provided training to allow the two individuals to complete center assessments independently.

Data Collection Protocol

Each randomly selected center was contacted by telephone and the project was described to the director or owner of the center following a prepared script (Appendix I). Appointments were set at the discretion of the director. When the project team member arrived at the center and before any aspect of the assessment was completed, the center director and food production staff member read the Letter of Consent, questions were answered and the letter was signed (Appendix J).

All assessments were completed either before food production began or after the food production area was cleaned at the end of the day to insure all centers were assessed when foodservice conditions were comparable. The AC and FPPQ were the first data collection forms completed during assessments; the DPSFC always was completed last. Prior to ending the visit, the project team member presented and briefly discussed the results of the assessment with the director and presented the director with two pamphlets about safe foodservice practices as a token of appreciation for participating in the study (Appendices K-L).

Statistical Analysis

Data were double-entered and analyzed using university facilities and Statistical Analysis System (SAS) programming (11). Each of the scores from the tools was tested for normality. When assumptions for parametric tests were met, multivariate analysis (MANOVA) with Tukey's Test, analysis of variance (ANOVA) and correlations were used. To measure the difference in the seven sub-topics and assessed foodservice conditions scores between urban and rural centers and among the directors' perception of the existing foodservice conditions, ANOVA and MANOVA with Tukey's Test were used, respectively. A correlation was performed to identify the relationship between the environmental health inspection scores and assessed foodservice conditions. Frequencies

were used to determine which of the seven foodservice sub-topics were identified as common sense and/or in need of training. For all analyses, statistical significance was set at $p < 0.05$.

RESULTS

Of the 164 urban child care centers, 58 (36.4%) were ineligible to participate because no food production occurred on-site and 36 (22.0%) could not be contacted. Of the remaining 70 eligible urban centers, 3 (1.8%) canceled appointments and 45 (64.3%) participated (9 in the pilot test and 36 in the study). Maximum occupancy of the participating urban centers ranged from 20 to 239 with a mean of 87.5 $\pm$ 51.1.

Of the 121 rural child care centers, 53 (43.8%) were ineligible to participate because no food production occurred on-site and 14 (11.6%) could not be contacted. Of the remaining 54 eligible rural centers, 1 (0.8%) canceled the appointment and 34 (63.0%) participated in the study. Maximum occupancy of the participating rural centers ranged from 20 to 150 with a mean of 63.4 $\pm$ 41.3.

There was not a significant difference (F=0.00; p=0.9516) between the mean assessed foodservice conditions score for urban (80.9 $\pm$ 4.8) and rural (80.8 $\pm$ 6.9) centers. To describe foodservice conditions overall, data from all urban and rural centers were combined and mean scores for the seven foodservice sub-topics calculated. A cut-off of <70% was determined as a threshold to identify sub-topics needing further attention for two reasons. This value (<70%) was used by the urban county's environmental health inspectors to determine non-compliance with state foodservice regulations and by Arday et al. (3) to define less than "partially compliant with standards". Only one sub-topic, safe food storage, was remarkable with a mean of 67.9 $\pm$ 11.6 (Table 1). Rural centers (70.8 $\pm$ 12.5) had statistically significant (F=4.40; p=0.0397) higher safe food storage scores than urban centers (65.1 $\pm$ 10.2).

Table 1 Assessed foodservice conditions and sub-topics scores, mean ± std. dev. (n=70)	
topics	score
assessed foodservice conditions	80.9 ± 5.9
handwashing/personal hygiene	91.6 ± 10.9
kitchen safety	86.8 ± 5.9
dishware and utensils	85.9 ± 13.7
kitchen cleanliness and repair	84.7 ± 9.9
chemical storage	84.3 ±18.3
quantity food production	81.7 ± 8.0
safe food storage	67.9 ± 11.6

Since the assumptions for parametric tests were not met for the directors' perception of the importance of maintaining safe foodservice conditions, no correlation could be calculated with assessed foodservice conditions score. However, directors' perception of existing foodservice conditions (average, very good, excellent) were compared to assessed foodservice conditions score. Multivariate analysis of variance and Tukey's test revealed that directors who perceived conditions to be excellent were in centers (83.9 ± 4.4) with significantly higher ($F=10.47$; $p<0.0001$) assessed foodservice conditions scores compared to the other two groups (very good 78.5 ± 6.3; average 77.8 ± 4.9). In addition, no director who perceived conditions to be excellent was in a center with an assessed foodservice conditions score below the 70% cut-off (minimum = 74.7), unlike directors in the very good (minimum = 67.8) or average (minimum = 65.1) group. There was no significant correlation ($r = -0.14$; $p=0.4163$) between assessed foodservice conditions score and the health department's environmental health inspection score.

When directors were asked if the foodservice sub-topics were common sense, handwashing/personal hygiene and kitchen cleanliness and repair received the most affirmative responses (Table 2). In response to whether or not foodservice training in general was needed, 88.6% of directors said 'yes.' Of the seven foodservice sub-topics, safe food storage, chemical storage and kitchen safety, received the most requests for training (Table 2).

Table 2
Directors' perception of foodservice sub-topics (n=70)

Foodservice Sub-topic	Common Sense		Training Needed	
	Yes	%	Yes	%
Safe Food Storage	44	62.9	63	90.0
Kitchen Safety	51	72.9	61	87.1
Chemical Storage	41	58.6	60	85.7
Kitchen Cleanliness and Repair	58	82.9	57	81.4
Quantity Food Production	33	47.1	54	77.1
Handwashing/Hygiene	58	82.9	48	68.6
Dishware/Utensils	52	74.3	46	65.7

DISCUSSION

In accordance with the recommendations of the *National Health and Safety Performance Standards* (7), this study did not assess the quality of child care centers, but identified areas in need of additional attention. The results of this study indicate that the assessed child care centers are meeting a majority of the foodservice standards, with very little difference between urban and rural centers. Similar findings were found by Arday et al. (3) who assessed 29 child development centers on military bases for a multitude of health and safety issues and recorded mean scores above 70% in categories relating to foodservice. These findings contradict Briley et al. (4) who found sanitation to be a significant problem in child care centers.

Safe food storage was identified as a topic needing additional attention, which is similar to the findings of Domer (5). For this study, safe food storage addressed: maintaining safe temperatures (hot and cold), sealing, labeling and dating all bulk foods, leftovers and open packages, disposing all leftovers after 24 hours and removing all corrugated cardboard. To derive the content of an appropriate training program, one would only have to look to the standards for objectives and recommendations.

Because the directors' perception of the importance of maintaining safe foodservice conditions were highly skewed for "very important," a correlation with assessed foodservice conditions score could not be performed. Two reasons could lead to the non-normal distribution. First, the directors knew the focus of the study, creating the potential for bias. This seems unlikely, however, since there was internal consistency for results of the visual assessment and verbal questionnaires (e.g., safe food storage was assessed at <70% and directors [90%] perceived this to be most in need of training). Alternatively, it is likely that an individual responsible for the safety of many children

will relegate any issue of safety as important, especially given the growing concern for foodborne disease.

The relationship between the directors' perception of existing foodservice conditions and the assessed foodservice conditions indicates that directors are aware of the conditions being maintained. The application of this finding is unknown. Identifying what directors' perceive to be the standard of excellence in foodservice conditions could be addressed in future studies. Perhaps directors look beyond standards into personnel attributes or other variables that impact the conditions.

The lack of a significant correlation between the environmental health inspection scores and assessed foodservice conditions scores was not unexpected. Environmental health inspections address issues beyond the foodservice focus of this study. For example, 21% of the urban county health department's inspection form was not addressed in this study, including issues of plumbing, sewage, outdoor refuse storage, lighting and dressing rooms. These issues are included in the *National Health and Safety Performance Standards*, but not in the foodservice sections assessed in this study.

The overwhelming request for additional foodservice training opportunities is similar to the findings of Dirige et al. (12). Safe food storage was identified by both the center assessments and directors' perceptions as the foodservice sub-topic most in need of training. Center assessments identified handwashing/personal hygiene as the foodservice sub-topic in least need of additional training, indicated by the high mean score. Directors supported this finding, as handwashing/personal hygiene received the second lowest number of requests for training. Both scenarios represent consistency in the center assessment results and directors' reported needs for staff training.

The success of this study was founded on the strong participation rate. Several factors contributed to the high participation rate, including: clarifying that assessments would not be done during food production; allowing directors to set the appointment

time; requiring only 35-40 minutes to complete the entire center assessment; and requiring only one visit to the center. Variables that impacted negatively on participation included the appointment making process, which often required multiple phone calls to arrange an appointment, and the timing of the study. The study assessments began in September when many directors were busy with demands of a new school year. The distance and time required for assessing the rural centers did not impact negatively the progress of the study, although inclusion of counties further away would introduce project staff or time limitations, considering normal hours of operation for centers.

Despite the strong participation rate, there were study design aspects that might restrict generalizability of results. It was assumed that center directors and food production staff members responded honestly to questions. Although appointments were made 4 to 10 days prior to the center assessment, it was assumed also that no special cleaning occurred the day of the assessment. To control for honesty would be impossible. To prevent special cleaning from being done, assessments would have had to be unannounced. Because participation was voluntary and director's permission was necessary to access each center, unannounced assessments were impossible.

Scheduled times for assessments were another study design limitation. Assessments were completed when food production areas were presumably clean, unlike unannounced environmental health inspections. Several items on the data collection tools related to cleanliness which could not be assessed or compared objectively if centers were assessed under different conditions.

This study did not address characteristics of non-participants and, therefore, its ability to generalize to the overall population is limited. It is not known whether assessed and non-assessed centers were from the same population or whether a selection bias occurred. One alternative to resolve this uncertainty would have been to collect environmental health inspection scores for all eligible centers and then compare scores

for assessed and non-assessed centers. While this method is not a true measure of similarity or difference, it would provide some form of comparison.

APPLICATIONS

The *National Health and Safety Performance Standards* are easy to use and apply to centers regardless of urban or rural classification. This study supports the use of these standards as the basis for national standards for child care centers that could be adopted by all 50 states, resolving the current inconsistencies. Because the rationale and methods for implementing the standards already exist in the standards, training for health departments' inspectors may improve inspection reliability between jurisdictions. Inspector caseloads also may be reduced with these standards, as the need for follow-up inspections could be reduced if inspections are based on easy to implement standards which are accessible to all center directors.

Training opportunities for child care centers should address safe food production, chemical storage and kitchen safety, topics identified through center assessments and by center directors. Since these areas were identified through direct contact with child care professionals and facilities, training opportunities that address these needs should be received positively by child care providers.

If an agency decided to use this study to assess the needs of the child care centers in its jurisdiction, two issues must be addressed prior to initiation. First, the individuals who complete the assessments must be familiar with foodservice facilities (e.g., previous foodservice work experience or education) to promote thorough and accurate results. Second, the criteria for identifying issues in need of attention (e.g., < 70%) must be defined.

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REFERENCES

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APPENDICES

APPENDIX A

Assessment Checklist

ID ____1-2
Urban(u) / Rural(r) ___3

Assessment Checklist
(1 = yes / 0 = no / 9 = not applicable)

Food Production Area

G___4 separate from eating, playing, toileting facilities via door, gate, counter or room divider
F___5 floor is clean (no visible dirt, food, paper, spills, trash)
F___6 floor is in good repair (no missing, chipped or cracked flooring or molding)
F___7 wall(s) and door(s) are clean (no visible dirt or food spills)
F___8 wall(s) and door(s) are in good repair (no cracks, no peeling paint)

Food Contact Surfaces

(questions specific to tables, countertops, carts)
F___9 clean (no visible dirt, food, spills, dust)
F___10 smooth, non-porous material (e.g. stainless steel, laminated countertops)
F___11 good repair (no chips, scratches, cracks, holes)
(questions specific to cutting boards)
F___12 without cuts or crevices (if cutting board is not located, ask for assistance)
F___13 clean (no food, spills, dirt, dust)

Hand Sink

B___14 available in the food production area
B___15 separate from food production sink(s)
B___16 supplied with hot and cold water
B___17 soap available at the sink
B___18 some method of drying clean hands available (e.g. non-reusable towels, air blower)
B___19 an 8 inch splashguard or sink at least 18 inches from food contact areas

Garbage

F___20 trash containers have tight fitting lids (lid should be on between deposits)
G___21 trash containers are labeled as such
G___22 trash is inaccessible to children (out of site or opening is at least 3 feet above the floor)
F___23 trash is emptied daily (containers should be empty at time of inspection)

Summary of Center Assessment

(A) quantity food production _____25-26 out of _____27-28
(B) handwashing / personal hygiene _____29 out of _____30
(C) safe food storage _____31-32 out of _____33-34
(D) dishware and utensils _____35-36 out of _____37-38
(E) chemical storage _____39 out of _____40
(F) kitchen cleanliness and repair _____41-42 out of _____43-44
(G) kitchen safety _____45-46 out of _____47-48
overall _____49-51 out of _____52-54

Dry Storage

___24 (c/r/b) unrefrigerated and unfrozen foods are stored in cabinets, a separate room or both (questions specific to food production area (i.e. on open shelves) and/or separate room)

C___25 food is stored at least 6 inches off of the floor

C___26 shelves are clean (no spilled foods, dust)

C___27 shelves are in good repair (no rust, peeling paint)

C___28 all corrugated cardboard is removed

C___29 bulk foods are stored in sealed food grade containers

C___30 bulk foods are stored in labeled food grade containers

C___31 bulk foods are stored in dated food grade containers (questions specific to a separate room, only)

F___32 floor is clean (no visible dirt, food, spills, dust)

F___33 floor is in good repair (no missing, cracked or chipped flooring or molding)

C___34 room is dry (no visible condensation on walls, shelves or floor) (questions specific to cabinets)

C___35 cabinet is clean (no visible dirt, food, spills, dust)

C___36 cabinet is dry (no visible condensation on walls or shelves)

C___37 all corrugated cardboard is removed

C___38 bulk foods are stored in sealed food grade containers

C___39 bulk foods are stored in labeled food grade containers

C___40 bulk foods are stored in dated food grade containers

Freezer

F___41 outside is clean, includes top of freezer unit (no visible dirt, food, spills)

C___42 inside is clean (no visible dirt, spills)

C___43 thermometer is located in the freezer (if not found in 10 seconds, ask for assistance)

C___44 thermometer is easily found (found and read in < 10 seconds)

C___45 temperature is zero (°F) or below

C___46 first five items inspected are in sealed containers

C___47 first five items inspected are in labeled containers

C___48 first five items inspected are in dated containers

A___49 visible meat products are government inspected

Refrigerator

F___50 outside is clean, includes top of refrigerator unit (no visible dirt, food, spills)

C___51 inside is clean (no visible dirt, spills)

C___52 thermometer is located in the refrigerator (if not found in 10 seconds, ask for assistance)

C___53 thermometer is easily found (found and read in < 10 seconds)

C___54 temperature is 40°F or below

C___55 first five items inspected are in sealed containers

C___56 first five items inspected are in labeled containers

C___57 first five items inspected are in dated containers

C___58 first five "leftover" items inspected are not over 24 hours old

C___59 raw foods are placed below cooked or ready to eat foods

A___60 visible milk is pasteurized and fortified with vitamin A

A___61 visible meat products are government inspected

Dishware and Utensils

___62 non-reusable (n) or reusable (r) plates used day-to-day (ask for assistance if necessary)
___63 non-reusable (n) or reusable (r) cups used day-to-day (ask for assistance if necessary)
D___64 if reusable plates are used, the first five plates inspected are without cracks or chips
D___65 if reusable plates are used, the first five plates inspected are made in the U.S.A.
D___66 if reusable cups are used, the first five cups inspected are without cracks or chips
D___67 if reusable cups are used, the first five cups inspected are made in the U.S.A.
D___68 at least one of the two systems below is available in the food production area (if reusable cups and plates are used exclusively, question #68 is not applicable)
___69 3 compartment sink with 2 drainboards
___70 dishwasher with 2 sinks with a sprayer
D___71 if non-reusable plates/cups are used at all in the center, they are not made of styrofoam

Cooking Equipment

F___72 where equipment is stored is clean (no visible dirt, food, spills, dust)
F___73 equipment is clean (no visible dirt, food, spills, dust)
G___74 heating units are inaccessible to children (at least 3 feet above the floor)
G___75 microwaves are inaccessible to children (at least 3 feet above the floor)
G___76 ventilation extends 6 inches beyond commercial cooking equipment
G___77 ventilation is provided for gas ranges
F___78 vents and filters are without visible grease buildup

Chemicals

E___1 all cleaning agents are stored separate from all foods (e.g. in a separate cabinet)
E___2 all cleaning agents are inaccessible to children (e.g. locked cabinet, child-proofed cabinet, cabinet at least 3 feet above the floor)
E___3 all containers holding chemicals are labeled with their contents
E___4 all chemicals are inaccessible to children (e.g. locked cabinet, child-proofed cabinet, cabinet at least 3 feet above the floor)
E___5 all chemicals are stored outside of the food production area

APPENDIX B

Food Production Practices Questionnaire

ID ____

Food Production Practices Questionnaire

The following questions are to be asked of the individual responsible for food production at the center the day of the on-site assessment.

A___6 "On a scale from one to five, one being all the time and five being none of the time, how often do you use _____ at this center?"

____7 (1-5) home canned food
____8 (1-5) food in rusty containers
____9 (1-5) food in bulging cans
____10 (1-5) food in leaky containers
____11 (1-5) food in unlabeled containers

A___12 "Are all fresh fruits and vegetables washed before being prepared or served? " ___ (y/n)

___13 "How do you thaw frozen food?" _____
A___14 _____

___15 "When you serve hot food, at what temperature (how hot) do you keep it?" ___ (temp.)
A___16

___17 "When you serve cold food, at what temperature (how cold) do you keep it?" ___ (temp.)
A___18

___19 "If you prepare food that sits out for a period of time, how long does it sit there before
A___20 you throw it out because it is not safe?" _____ (period of time in minutes)

___21 "How often do you reuse or wash disposable plates, cups or utensils before they are
D___22 thrown out?" _____

(#23 - 31 are not applicable in centers that use a dishwasher to sanitize all dishes and utensils.)
(#23 - 32 are not applicable in a center that uses disposable dishes and cups exclusively.)

___23 "When washing and sanitizing dishware and utensils, what does each sink compartment
___24 hold? Be specific." first compartment _____
___25 second compartment _____
D___26 third compartment _____

___27 "Which method is used here to sanitize dishes and cups?" _____ (temp or chemical)

D___28 "Is a thermometer or chem strip available to monitor temperature or chemical concentration?" ____ (y/n)

___29 "When sanitizing dishes and cups, what temperature and/or concentration of chemicals
___30 do you use and for how long?" _____
D___31 _____

D___32 "After sanitizing the dishes, do you towel dry them or let them air dry?" _____

G___33 "Do animals ever get into or are carried into the food production area?" ____ (y/n)

G___34 "Do you permit infants or toddlers (<3 years old) in the food production area?" ___ (y/n)

G___35 "Do you permit children 3 years of age or older in the food production area?" ___ (y/n)
if yes, "What if any precautions are taken?" _____

G___36 "Do you permit children 5 years of age or older ("school age") in the food production area during hot food production?" ____ (y/n)

___37 "If an individual responsible for food production comes to work complaining of feeling
B___38 sick or physically appears sick, what happens?" _____
_____

___39 "If an individual responsible for food production comes to work with cuts or open sores
___40 on his/her hands, is this person allowed to work? _____ (y/n)
B___41 if yes, "What if any precautions are taken?" _____
_____

___42 "Do individuals who change diapers also prepare food on the same day?" ____ (y/n)
___43 if yes, "What if any precautions are taken?" _____
B___44 _____

___45 "How is formula and baby food warmed?" _____
A___46 _____

(Ask the next two questions only if reusable plates and/or cups are used and they are not made in the U.S.A., identified in completing the Assessment Checklist.)

D___47 "Does the center have the certificate verifying the safety of the plates used here?" __ (y/n)

D___48 "Does the center have the certificate verifying the safety of the cups used here?" ___ (y/n)

A___49 "Prior to preparing foods, do you "inspect" or assess the foods and ingredients to assure that they are not spoiled?" ___ (y/n)

A___50 "On a scale from 1 to 5, 1 being always and 5 being never, the meats used in this center are government inspected?" ___ (1-5)

A___51 "On a scale from 1 to 5, 1 being always and 5 being never, the dairy products used in this center are pasteurized?" ___ (1-5)

A___52 "On a scale from 1 to 5, 1 being always and 5 being never, how often does this center use raw or unpasteurized milk?" ___ (1-5)

___53 "Does this center use dry milk?" ___ (y/n)
___54 if yes, "How is it used/what is it used for?" _____
___55 "In regards to storage of reconstituted dry milk, how is it stored and for how long
A___56 before it is thrown out?" _____

___57 "How long does meat, chicken, fish, milk or eggs sit on the counter before being prepared
A___58 or served for a meal?" _____ (minutes)

___59 "Does this center prepare foods or keep foods warm by steam?" ___ (y/n)
___60 if yes, "How long do you allow foods to be heated by steam before you place them in a
A___61 container and then refrigerate/freeze them?" _____ (time)

___62 "How are meals served at this center ?" _____
___63 "If food is left on a child's plate or in serving bowls at the end of a meal, what is done
A___64 with the food?" _____

___65 "If a large pan of soup is left after a meal, is the large pan placed directly into the
___66 refrigerator or freezer?" ____ (y/n)
A___67 if not, "What do you do with that food before it is placed in the refrigerator or freezer?"
_____

___68 "If a child brings in a medicine that requires refrigeration, what is done with that
A___69 medicine?" _____

___70 "Explain what happens to baby bottles, bottle caps and nipples after the baby empties the
D___71 bottle, in regards to cleaning them?" _____

___72 "Are reusable napkins and bibs used at this center?" ___ (y/n)
___73 if yes, "How frequently are they washed with soap (laundered)?" _____
D___74

F___75 "How often/when is the kitchen cleaned? Be very specific." _____

F___76 "How often/when is the kitchen sanitized? Be very specific." _____

F___77 "How often/when are the dining area and tables cleaned?" _____

F___78 "How often/when are the dining area and tables sanitized?" _____

F___79 "How often/when is the kitchen equipment (e.g. knives, cutting boards, pots, pans)
cleaned?" _____

F___80 "How often/when is the kitchen equipment (e.g. knives, cutting boards, pots, pans)
sanitized?" _____

APPENDIX C

Director's Perception of Safe Foodservice Conditions

ID ___

Director's Perception of Safe Foodservice Conditions

___1 "On a scale from 1 to 5, 1 being excellent and 5 being poor, in your opinion, what are the sanitary conditions of the kitchen in this center?"

1 2 3 4 5
excellent (average) poor

___2 "On a scale from 1 to 5, 1 being very satisfied and 5 being not at all satisfied, how satisfied are you with the sanitary conditions?"

1 2 3 4 5
very satisfied not at all satisfied

___3 "On a scale from 1 to 5, 1 being not at all important and 5 being very important, how important is it to you to maintain sanitary foodservice conditions every day?"

1 2 3 4 5
not at all important very important

___4 "On a scale from 1 to 5, 1 being very important and 5 being not at all important, how important to you is it for your staff responsible for food production to be trained in safe foodservice practices?"

1 2 3 4 5
very important not at all important

___5 "On a scale from 1 to 5, 1 being not at all important and 5 being very important, when hiring staff for food production, how important to you is previous work experience or education related to foodservice?"

1 2 3 4 5
not at all important very important

___6 "On a scale from 1 to 5, 1 being not at all important and 5 being very important, how important to you is an orientation about safe foodservice practices for new staff responsible for food production?"

1 2 3 4 5
not at all important very important

___7 "On a scale from 1 to 5, 1 being very important and 5 being not at all important, how important to you is having a written protocol for safe food production which your staff is to follow every day?"

1 2 3 4 5
very important not at all important

___8 "On a scale from 1 to 5, 1 being not at all important and 5 being very important, how important to you is it to provide training sessions about safe food practices for your staff that is responsible for food production?"

1 2 3 4 5

not at all important very important

___9 "On a scale from 1 to 5, 1 being very important and 5 being not at all important, how important to you is it that your staff responsible for food production fulfill at least part their annual training hours with classes about safe food production?"

1 2 3 4 5

very important not at all important

___10 "Is there a need for training opportunities that address safe foodservice practices?"
___ (y/n)

"Is (insert each of the topics, one at a time) common sense?"
"Is (insert each of the topics, one at a time) a topic that needs training opportunities made available?"

(1 = yes / 0 = no)

common sense (1/0)	topics	training (1/0)
___11	quantity food production	___18
___12	handwashing / personal hygiene	___19
___13	safe food storage	___20
___14	dishware and utensils	___21
___15	chemical storage	___22
___16	kitchen cleanliness and repair	___23
___17	kitchen safety	___24

APPENDIX D

Guide for Completing the Food Production Practices Questionnaire

Guide for Completing the
Food Production Practices Questionnaire

#6 place a 1 in #6 if questions #7-11 are all answered with a 5 (none of the time)
place a 0 in #6 if any <u>one</u> question #7-11 is answered with a number other than 5

#12 place a 1 in #12 if the answer is y
place a 0 in #12 if the answer is n

#13 place the appropriate letter in #13

A. microwave
B. under cool running water
C. refrigerator
D. part of the cooking process
E. on the sink
F. any combination of A-D
G. any combination of A-E

#14 place a 1 in #14 if the answer to #13 is A, B, C, D, or F
place a 0 in #14 if the answer to #13 is E or G

#15 place the appropriate letter in #15

A. < 140' F
B. >= 140' F
C. do not know

#16 place a 1 in #16 if the answer to #15 is B
place a 0 in #16 if the answer to #15 is A or C

#17 place the appropriate letter in #17

A. <= 40' F
B. > 40' F
C. do not know

#18 place a 1 in #18 if the answer to #17 is A
place a 0 in #18 if the answer to #17 is B or C

#19 place the appropriate letter in #19

A. < 120 minutes
B. >= 120 minutes

#20 place a 1 in #20 if the answer to #19 is A
place a 0 in #20 if the answer to #19 is B

#21 place the appropriate letter in #21

A. disposable plates, cups or utensils are not used
B. none, (one use only)
C. any value greater than none

#22 place a 9 in #22 if the answer to question #21 is A
place a 1 in #22 if the answer to question #21 is B
place a 0 in #22 if the answer to question #21 is C

(Place a 9 in #23-31 if the center uses a dishwasher to sanitize all dishes and utensils.)
(Place a 9 in #23-32 if the center uses disposable dishes and cups exclusively.)

#23 place the appropriate letter in #23, #24 and #25

#24 A. hot water with a detergent/soap B. cold/cool water with detergent/soap

#25 C. hot water only D. cold water only

E. hot water with bleach/sanitizer F. cold water with bleach/sanitizer

#26 place a 1 in #26 if the answer to #23 is A, #24 is C and #25 is E
place a 0 in #26 if the answer to #23 is not A, #24 is not C or #25 is not E

#27 place a t in #27 if sanitizing is completed through a thermal method
place a c in #27 if sanitizing is completed through a chemical method

#28 place a 1 in #31 if the answer is y
place a 0 in #31 if the answer is n

#29 place the appropriate letter in #29

(temperature)	(chemical)
A. < 170' F	A. < 50 ppm chlorine
B. >= 170' F	B. at least 50 - 100 ppm

#30 place the appropriate letter in #30

(temperature)	(chemical)
A. < 30 seconds	A. < 60 seconds
B. >= 30 seconds	B. >= 60 seconds

#31 place a 1 in #31 if the answers to #29 and #30 are B for temperature or chemical
place a 0 in #31 if the answers to #29 and #30 are not both B

#32 place a 1 in #32 if the answer is air dry
place a 0 in #32 if the answer is towel dry

#33 place a 1 in #33 if the answer is n
place a 0 in #33 if the answer is y

#34 place a 1 in #34 if the answer is n
place a 0 in #34 if the answer is y

#35 place a 1 in #35 if the answer is n
place a 1 in #35 if the answer is y and the child is accompanied by a staff member
place a 0 in #35 if the answer is y and no precautions are taken

#36 place a 1 in #36 if the answer is n
place a 0 in #36 if the answer is y

#37 place the appropriate letter in #37
A. sent home, reassigned to a non-food task or someone else cooks
B. allowed to prepare food

#38 place a 1 in #38 if the answer to #37 is A
place a 0 in #38 if the answer to #37 is B

#39 place a 1 in #39 if the answer is y
place a 0 in #39 and a 9 in #40 if the answer is n

#40 place the appropriate letter in #40
A. wear bandaids/bandages
B. wear nonporous/latex gloves
C. both A and B
D. none of the above

#41 place a 1 in #41 if the answer to #39 is 0
place a 1 in #41 if the answer to #39 is 1 and the answer to #40 is B or C
place a 0 in #41 if the answer to #39 is 1 and the answer to #40 is A or D

#42 place a 1 in #42 if the answer is y
place a 0 in #42 and a 9 in #43 if the answer is n

#43 place the appropriate letter in #43
A. wash hands thoroughly
B. wear rubber gloves
C. both A and B
D. none of the above

#44 place a 9 in #44 if the answer to #42 is 0
place a 1 in #44 if the answer to #42 is 1 and the answer to #43 is A or C
place a 0 in #44 if the answer to #42 is 1 and the answer to #43 is B or D

#45 place the appropriate letter in #45
A. microwave
B. under warm running water
C. in a pan of warm water
D. any combination of the above
E. no warming of formula
F. no formula is prepared at the center

#46 place a 9 in #46 if the answer to #45 is F
place a 1 in #46 if the answer to #45 is B, C or E
place a 0 in #46 if the answer to #45 is A or D

#47 place a 9 in #47 if the answer to Checklist Question #65 is 1
place a 1 in #47 if the answer to Checklist Question #65 is 0 and the answer to this question is y
place a 0 in #47 if the answer to Checklist Question #65 is 0 and the answer to this question is n

#48 place a 9 in #48 if the answer to Checklist Question #67 is 1
place a 1 in #48 if the answer to Checklist Question #67 is 0 and the answer to this question is y
place a 0 in #48 if the answer to Checklist Question #67 is 0 and the answer to this question is n

#49 place a 1 in #49 if the answer is y
place a 0 in #49 if the answer is n

#50 place a 1 in #50 if the answer is 1
place a 0 in #50 if the answer is 2, 3, 4 or 5

#51 place a 1 in #51 if the answer is 1
place a 0 in #51 if the answer is 2, 3, 4 or 5

#52 place a 1 in #52 if the answer is 5
place a 0 in #52 if the answer is 1, 2, 3 or 4

#53 place a 1 in #53 if the answer is y
place a 0 in #53 and a 9 in #54 and #55 if the answer is n

#54 place the appropriate letter in #54
A. cooking B. any use other than cooking

#55 place the appropriate letter in #55
A. sealed, labeled and dated, in the refrigerator, and for no more than 24 hours
B. not sealed, labeled and dated C. not in the refrigerator
D. for more than 24 hours E. any combination of B through D

#56 place a 9 in #56 if the answer to #53 is 0
place a 1 in #56 if the answers to #53 is 1, #54 is A and #55 is A
place a 0 in #56 if the answers to #53 is 1, and #54 is not A or #55 is not A

#57 place the appropriate letter in #57
A. 0 minutes, does not sit out B. any amount of time > 0

#58 place a 1 in #58 if the answer to #57 is A
place a 0 in #58 if the answer to #57 is B

#59 place a 1 in #59 if the answer is y
place a 0 in #59 and a 9 in #60 if the answer is n

#60 place the appropriate letter in #60
A. <= 30 minutes B. > 30 minutes

#61 place a 9 in #61 if the answer to #59 is 0
place a 1 in #61 if the answer to #59 is 1 and the answer to #60 is A
place a 0 in #61 if the answer to #59 is 1 and the answer to # 60 is B

#62 place the appropriate letter in #62
A. children serve themselves B. cook/teacher prepares plates

#63 place the appropriate letter in #63
A. all food is thrown out
B. if food is served by staff, food remaining in serving bowls is sealed, labeled, dated and placed in the refrigerator; food on childrens' plates is thrown out
C. if food is served family style, all uneaten food is thrown out, except untouched low-risk foods (i.e. bread, rolls) are sealed, labeled and dated
D. all food is sealed, labeled, dated and placed in the refrigerator
E. none of the above

#64 place a 1 in #64 if the answer to #63 is A, B, or C
place a 0 in #64 if the answer to #64 is D or E

#65 place a 1 in #65 if the answer is y
place a 0 in #65 if the answer is n

#66 place the appropriate letter in #66
A. food is transfered to a container, food in layers < 3" thick, food is allowed to cool and then sealed, labeled and dated and placed in refrigerator / freezer
B. food is not transfered to a pan with food layers < 3" thick
C. new pan holding the food is not cooled before being covered
D. new pan is not sealed, labeled and dated before placed in refrigerator / freezer
E. any combination of B, C and D
F. all leftover food is thrown out
G. no large quantities of food are prepared

#67 place a 9 in #67 if the answer to #65 is 0 and the answer to #66 is F or G
place a 1 in #67 if the answer to #65 is 0 and the answer to #66 is A
place a 0 in #67 if the answer to #65 is 1
place a 0 in #67 if the answer to #65 is 0 and the answer to #66 is B, C, D or E

#68 place the appropriate letter in #68
A. stored in the refrigerator
B. separate from food (e.g. in a box)
C. inaccessible to children (e.g. locked box, on a shelf out of reach, in a drawer)
D. all of the above
E. none of the above
F. no medicines

#69 place a 9 in #69 if the answer to #68 is F
place a 1 in #69 if the answer to #68 is D
place a 0 in #69 if the answer to #68 is A, B, C or E

#70 place the appropriate letter in #70
A. send empty bottles home with parents
B. no infants are enrolled at the center
C. bottles, caps and/or nipples are washed between uses
D. bottles, caps and nipples are sanitized between uses
E. anything not above

#71 place a 9 in #71 if the answer to #70 is A or B
place a 1 in #71 if the answer to #70 is D
place a 0 in #71 if the answer to #70 is C or E

#72 place a 1 in #72 if the answer is y
place a 0 in #72 and a 9 in #73 if the answer is n

#73 place the appropriate letter in #73
A. sent home with parents B. laundered with soap after each use
C. any practice other than A or B

#74 place a 9 in #74 if the answer to #72 is 0
place a 9 in #74 if the answer to #72 is 1 and the answer to #73 is A
place a 1 in #74 if the answer to #72 is 1 and the answer to #73 is B
place a 0 in #74 if the answer to #72 is 1 and the answer to #73 is C

#75 place a 1 in #75 if the answer indicates "before/after meals and uses"
place a 0 in #75 if the answer does not indicate "before/after meals and uses"

#76 place a 1 in #75 if the answer indicates "before/after meals and uses"
place a 0 in #75 if the answer does not indicate "before/after meals and uses"

#77 place a 1 in #75 if the answer indicates "before and after each meal"
place a 0 in #75 if the answer does not indicate "before and after each meal"

#78 place a 1 in #75 if the answer indicates "before and after each meal"
place a 0 in #75 if the answer does not indicate "before and after each meal"

#79 place a 1 in #75 if the answer indicates "after each use"
place a 0 in #75 if the answer does not indicate "after each use"

#80 place a 1 in #75 if the answer indicates "after each use"
place a 0 in #75 if the answer does not indicate "after each use"

APPENDIX E

Guide for Completing the Summary of Center Assessment Form

Guide for Completing the
Summary of Center Assessment Form (SCA)

Refer to both the Assessment Checklist and the Food Production Practices Questionnaire in completing these calculations.

example: AQuantity Food Production _(b)_ out of _(a)_.

To calculate (a) for Quantity Food Production, count all of the data lines that are prefixed with the letter A and contain either a 0 or 1. Do not count those lines that contain a 9.

For instance, count: A_1_49 visible meat products are government inspected
A_0_60 visible meat products are government inspected
do not count: A_9_61 visible milk is pasteurized and fortified with vitamin A

To calculate (b) for Quantity Food Production, count all of the data lines that are prefixed with the letter A and contain a 1. Do not count those lines that contain a 0 or 9. In the example above, only A_1_49 would be included in calculating (b).

A box containing the seven topics, prefixed with their respective letters (A - G), is provided on the front page of the Assessment Checklist for convenience. Repeat the process of calculating (a) and (b) for all seven topics, then transfer the results to the Summary of Center Assessment form.

On the Summary of Center Assessment form (SCA), there is a space headed by the words - Areas of Interest. The project team member completing the assessment is to use this space to document specific problem areas that were identified during the assessment process (i.e. a thermometer should be in all freezers and refrigerators).

In reviewing the completed Summary of Center Assessment (SCA) form with the center director, reference should be made to the document that was used in developing the assessment tools, as written in the paragraph on the SCA form. This clarification may answer questions relating to the basis for inclusion of the items and issues addressed during the assessment.

The project team member should review any identified problem areas documented on the SCA form; however, he/she should feel no obligation to provide alternatives or suggestions for correcting the problem areas.

The completed SCA form is to be left with the center director.

APPENDIX F

Summary of Center Assessment

Summary of Center Assessment

The *National Health and Safety Performance Standards: Guidelines for Out-of-Home Child Care Programs*, created by the American Academy of Pediatrics and the American Public Health Association, was used to develop the assessment tools used during this study.

Quantity Food Production _____ out of _____

Handwashing / Personal Hygiene _____ out of _____

Safe Food Storage _____ out of _____

Dishware and Utensils _____ out of _____

Chemical Storage _____ out of _____

Kitchen Cleanliness and Repair _____ out of _____

Kitchen Safety _____ out of _____

Areas of Interest:

Thank you for participating in this study.

APPENDIX G

Guide for Completing the Director's Perception of Safe Foodservice Conditions

Guide to Completing the
Director's Perception of Safe Foodservice Conditions

#1 place the number circled in #1

#2 place the number circled in #2

#4 if 1 is circled, place a 5 in #4, #7, #9
#7 if 2 is circled, place a 4 in #4, #7, #9
#9 if 3 is circled, place a 3 in #4, #7, #9
if 4 is circled, place a 2 in #4, #7, #9
if 5 is circled, place a 1 in #4, #7, #9

#3 if 1 is circled, place a 1 in #3, #5, #6, #8
#5 if 2 is circled, place a 2 in #3, #5, #6, #8
#6 if 3 is circled, place a 3 in #3, #5, #6, #8
#8 if 4 is circled, place a 4 in #3, #5, #6, #8
if 5 is circled, place a 5 in #3, #5, #6, #8

#10 place a 1 in #10 if the answer is y
place a 0 in #10 if the answer is n

#11-#24 1 = yes / 0 = no

APPENDIX H

Environmental Health Inspection Scores

ID ____

Environmental Health Inspection Scores
(scores should be expressed as a percentage)

_____55-57 Most Recent Score

_____58-60 Second Most Recent Score

_____61-63 Third Most Recent Score

APPENDIX I

Script for Initial Phone Contact

Script for Initial Phone Contact

"Hello. May I speak with _(director's name)_?"

(if asked who is calling...)
"My name is _(research project team member)_. I am a graduate student at the University of Tennessee."

(director picks up the phone) "Hello Ms./Mr. _(director's last name)_. My name is (team member). I'm a Nutrition graduate student at the University of Tennessee in Knoxville. If you have a few minutes, I would like to explain a study that I am currently working on that your center could participate in. Do you have a few spare minutes?"

(if the director says that this is an inconvenient time, ask if you can call back later in the day or perhaps on a different day. If the director indicates that she/he is not interested, politely ask why; then thank the director for her/his time and end the phone call)

(if the director says that she/he has a few minutes, then proceed.) "I am currently involved in a project that is assessing the foodservice sanitation conditions of licensed child care centers in east Tennessee. We are also interested in how important center director's feel staff training and foodservice sanitation are. This project is not associated with either the Health Department or Day Care Licensing, so any information that is collected in this study will not be shared with either agency. In fact, all of the information collected will remain confidential. In order for your center to be included in this study, your center must have a food production area or a kitchen. Do you have a kitchen at your facility?"

(if 'no,' thank the director for her/his time and end the phone call)

(if 'yes,' then continue) "Good. Again, the goals of this project are to assess the sanitary conditions of child care centers and to assess center director's feelings about the importance of sanitation and employee training. If you choose to participate in this study, I would come to your center for about 45 minutes. In that time, I would evaluate your food production area and ask the individual responsible for food production at your center some questions about food production practices. I would also like to ask you some questions about the importance of staff training and foodservice sanitation. Now, there is one timing issue to this study. I would like to visit your center either before the food production area is used in the morning or after it is cleaned at the end of the day. This way all of the child care centers that participate in this study will be assessed at a similar time. It is also important that you and the individual responsible for food production are available to answer some questions. All the information that is collected at your center will be grouped with all of the other centers that participate in the study and will only be seen by research project team members. In appreciation for your participation, I will provide you with some literature about foodservice sanitation as well

as a review of the completed assessment of your center. When this study is completed, you will also have access to the summary data from all of the centers that are included in this project. Does this sound like something you would be interested in participating in?"

(if 'no,' politely ask why; then thank the director for his/her time)

(if 'yes,' then continue) "What questions do you have?" (Answer all questions.) "Okay. Why don't we go ahead and set a day and time that I can come to your center?" (Set appointment for before the food production is used or after it is cleaned at the end of the day.) "When I arrive at your center and before anything else is done, your staff member responsible for food production, you and I will sign a 'Letter of consent,' which has in writing the details of the study which I have just shared with you. This letter will serve as permission for me to assess your center and will represent you and your staff member's willingness to answer some questions. My signature indicates that I will only do what we have discussed and that all information that I collect will remain confidential. Do you have any questions I can answer at this time?"

(Answer any questions that the director may have.) "Would you like me to call you the day before the appointment to confirm that scheduling is still okay? Again thank you for your interest in this study, and I'll see you on _(appointment date)_. Have a nice day Ms./Mr. _(director's last name)_. Good bye"

APPENDIX J

Letter of Consent

Letter of Consent

Dear Day Care Center Director:

This project has three goals:

1. assess the foodservice conditions of licensed day care centers in urban and rural counties in east Tennessee
2. determine if a difference in conditions exists between these two groups
3. assess how the director's perceptions about the importance of safe foodservice conditions impact the conditions at the center

Your center is one of 60 licensed day care centers selected randomly that will be included in this study.

Your participation in this study will be confidential and require 45 to 50 minutes. In that time, a research project team member will assess the food production area/kitchen of your center and ask the individual responsible for food production at your center questions regarding food production practices. You, as the director, will be asked questions about how you feel about foodservice safety and staff training.

The results of this project will provide information regarding the needs of the day care industry in east Tennessee. This information can then be used to develop programs to meet those needs. The data collected from this project will be prepared for publication in a professional journal for other individuals to utilize in assessing the needs of the day care centers in their area. As a sign of appreciation for your participation in the study, you will receive literature on foodservice sanitation and a summary of the completed assessment of your center. In addition, you will be offered the opportunity to receive a copy of the data from all 60 centers and the conclusions drawn at the end of the project.

Your participation in this study carries no risk for your center or staff members. Participation will remain confidential; data collection tools contain no markings to indicate your identity and collected data will be stored separate from signed letters of consent. All data collection tools will be stored in a locked room in the Department of Nutrition. Only the research project team members will have access to them. As participation in this study is voluntary, you may withdraw at any time without penalty. If you have any questions regarding the project, contact the project team leader, Todd Kirkpatrick, at 558-7566.

* * * * * * * *

I have read this document and understand the design and expectations of this project and have had any questions answered to my satisfaction. I voluntarily agree to participate.

_____	_____
(center director)	(date)
_____	_____
(food production staff member)	(date)
_____	_____
(research project assistant)	(date)

APPENDIX K

Pamphlet: Food Storage

Power's Out

Your freezer

- Without power, a full upright or chest freezer will keep everything frozen for about two days.
- A half-full freezer will keep food frozen one day.
- If power will be coming back on fairly soon, you can make the food last longer by keeping the door shut as much as possible.
- If power will be off for an extended period, take food to friends' freezers, locate a commercial freezer or use dry ice.

Your refrigerator-freezer combination

- Without power, the refrigerator section will keep food cool four to six hours, depending on the kitchen temperature.
- A full, well-functioning freezer unit should keep food frozen for two days. A half-full freezer unit should keep food frozen about one day.
- Block ice can keep food in the refrigerator cold for a longer time. Dry ice can be added to the freezer unit. You can't touch dry ice and you shouldn't breathe the fumes, so follow handling directions carefully.

Thawed food?

- Food still containing ice crystals or that feels refrigerator-cold can be refrozen.
- Discard any thawed food that has risen to room temperature and remained there two hours or more. Immediately discard anything with a strange color or odor.

References

COMMON SENSE FISH COOKERY - U.S. Department of the Interior
FREEZING MEAT AND FISH IN THE HOME - USDA, Home and Garden Bulletin No. 93
FAMILY MEAL SERIES - USDA, Home and Garden Bulletins No. 105, 125, 127, 103, 118
A QUICK CONSUMER GUIDE TO SAFE FOOD HANDLING - USDA Home & Garden Bulletin No. 248

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Food Storage

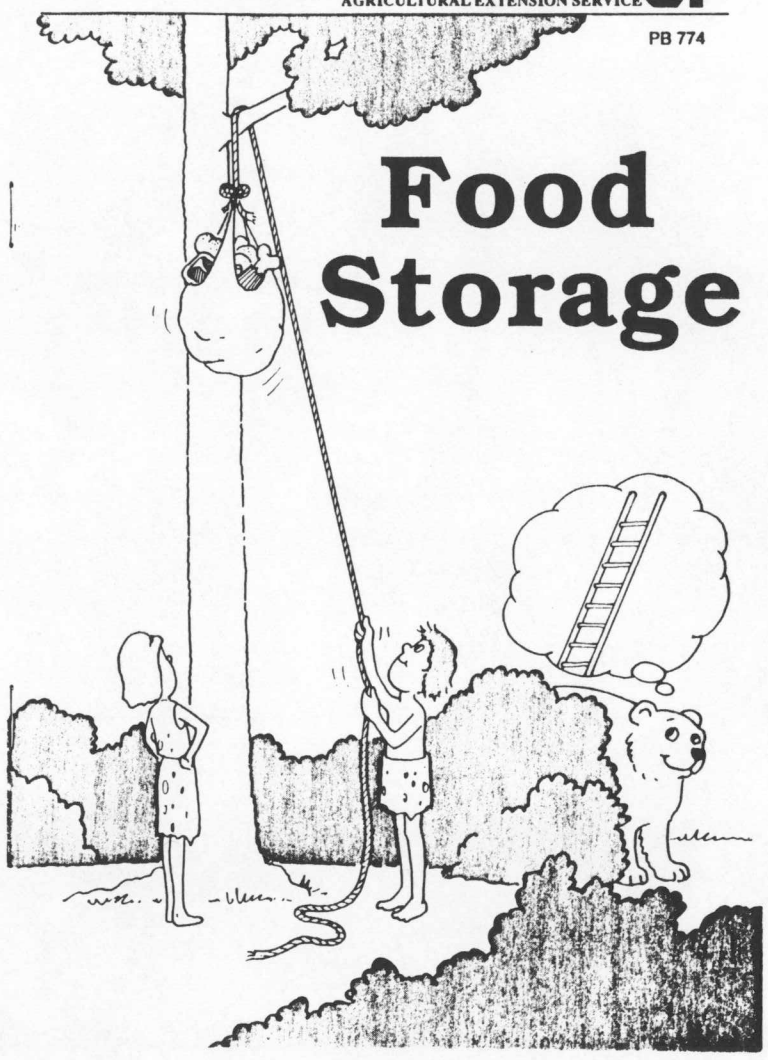


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Gail W. Disney, Associate Professor
Originally developed by Reba K. Hendren, Professor and Leader (Retired)
Food, Nutrition and Health

Food Storage Guide

Proper storage will prolong the period of time foods may be kept before being eaten. Treatment of food before and during storage affects its quality and safety. Foods should be handled with clean hands and equipment. Handle and store meat, poultry and fish so juices from the raw food are not dripped on or transferred to other foods, especially those which will be eaten raw, such as vegetables and fruits.

Maintain your refrigerator at 40 F or below and your freezer at 0 F or below. Keep your refrigerator as cold as possible without freezing milk or lettuce.

The following tables are designed to show safe food storage methods and the length of time each food will retain optimum flavor, color, texture and nutrients.

FOOD	SHELF		REFRIGERATOR 35-40° F		FREEZER 0°F	
	CARE	TIME	CARE	TIME	CARE	TIME
Butter or margarine	Wrapped - in cool place	3-5 days	Wrapped	2-4 months	Freezer wrapped	6-8 months
Mayonnaise or salad dressing, opened		Not recommended	Closed	6-12 weeks		Not recommended
Lard	Closed - in cool place	1-2 months	Closed	4-5 months	Freezer wrapped	10-12 months
Oils	" "	2-3 months	Closed	4-5 months		
Vegetable shortening	" "	2-4 months	Closed	4-5 months	Freezer wrapped	10-12 months

FRUITS - STORAGE PERIOD

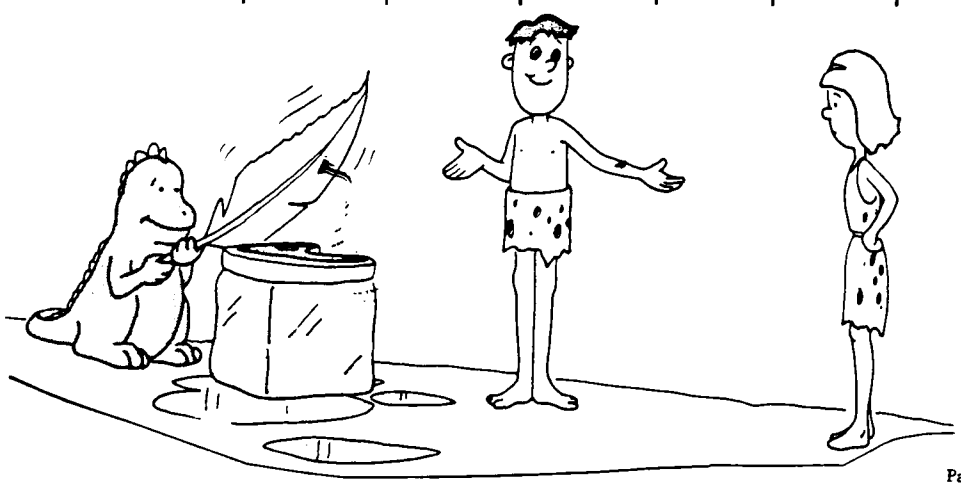
FOOD	REFRIGERATOR 35-40° F		FREEZER 0° F	
	CARE	TIME	CARE	TIME
Apples	Washed & dried	1 week	Freezer container	8-12 months
Apricots	Washed & dried	1 week	" "	8-12 months
Bananas (ripe)	Whole - in peel	1-2 days	" "	
Berries (most varieties)	Whole, uncovered	1-2 days	" "	8-12 months
Blueberries	Whole, uncovered	3-5 days	" "	8-12 months
Citrus fruits	Washed & dried	2 weeks	Sections or slices, in freezer container	4-6 months
Frozen juices (concentrated)	Container	Not recommended	Original container	4-6 months
Frozen juices (reconstituted)	Covered	3-5 days	Freezer container	
Cherries	Whole, uncovered	1-2 days	" "	8-12 months
Cranberries	Carton or tray	1 week	" "	8-12 months
Grapes	Whole, uncovered	3-5 days	" "	10-12 months
Peaches	Washed & dried	3-5 days	" "	8-12 months
Pears	Washed & dried	3-5 days	" "	8-12 months
Plums	Washed & dried	3-5 days	" "	8-12 months
Rhubarb	Washed & dried in plastic bag	3-5 days	" "	8-12 months
Watermelon	Covered	3-5 days	Pieces frozen in sugar sirup	6-8 months

GRAINS (BREADS & CEREALS)-STORAGE PERIOD

FOOD	SHELF		REFRIGERATOR 35-40° F		FREEZER 0° F	
	CARE	TIME	CARE	TIME	CARE	TIME
Quick Breads	closed container					
Biscuits and Muffins	" "	2-3 days	Wrapped	1-2 weeks	Freezer wrapped	3 months
Commercial Refrigerated Biscuits	" "	Not recommended	In original container	As dated on container		Not recommended
Corn Bread & Muffins	" "	2-3 days	Wrapped	1-2 weeks	Freezer wrapped	3 months
Yeast Breads						
Bread & Rolls, baked	" "	4-5 days	In wrapper	1-2 weeks	" "	2-3 months
Brown & Serve Rolls	" "	2-3 days	In wrapper	1-2 weeks	" "	2-3 months
Cinnamon Rolls	" "	2-3 days	In wrapper	1-2 weeks	" "	2 months
Freezer Bread & Rolls, unbaked	" "	Not recommended	In wrapper	2-3 days	" "	4 weeks
Cakes						
Angel & Chiffon	" "	2-3 days	Wrapped	4-5 days	Freezer wrapped	2 months
Frosted	" "	2-3 days	Wrapped	4-5 days	" "	1-2 months
Fruit Cakes	" "	2-3 months	Wrapped	6-8 months	" "	1 year
Plain, unfrosted	" "	2-3 days	Wrapped	4-5 days	" "	3 months
Pound	" "	2-3 days	Wrapped	4-5 days	" "	6 months
Cookies						
Baked	" "	2-3 weeks			Freezer wrapped	6-9 months

Page 3

FOOD	SHELF		REFRIGERATOR 35-40°F		FREEZER 0°F	
	CARE	TIME	CARE	TIME	CARE	TIME
Cookies						
Unbaked		Not recommended	Wrapped In original container	3-5 days	Freezer Wrapped	6-9 months
Unbaked, commercial		" "		As dated on carton	" "	6-9 months
Pastry Shells						
Baked	Wrapped	2-3 days	Wrapped	4-5 days	" "	2-3 months
Unbaked		Not recommended	" "	1-2 days	" "	2 months
Pies						
Fruit, baked	Covered	2-3 hrs.	Wrapped	2-3 days	Freezer wrapped	2 months
Fruit, unbaked		Not recommended	"	1-3 days	" "	8 months
Cereals						
Ready-to-eat	Cool, dry place	2-3 months				
To be cooked	" "	4-6 months				
Flour	" "	4-6 months				
Meal,	" "	3-4 months				
Noodles						
Plain	Cool dry place	1 year				
With egg	" "	6 months				
Rice						
Brown	Cool dry place	6 months				
White	" "	1 year				
White, packaged, pre-cooked	" "	1 year				



Page 5

MEAT, POULTRY AND FISH - STORAGE PERIOD

FOOD	REFRIGERATOR 35-40°F		FREEZER 0°F	
	CARE	TIME	CARE	TIME
Beef (raw)				
Roasts	Loosely wrapped	3-5 days	Freezer wrapped	8-12 months
Steaks	" "	3-5 days	" "	6-12 months
Stew meat	" "	1-2 days	" "	3-4 months
Ground meat		1-2 days		3-4 months
Pork (raw)				
Roasts	Loosely wrapped	3-5 days	Freezer wrapped	4-8 months
Chops	" "	3-5 days	" "	3-4 months
Bacon	Original package	7 days	" "	1 month
Ham - Whole (cured)*	Loosely wrapped	7 days	" "	1-2 months
Ham - half (cured)	" "	3 days	" "	1-2 months
Ham slices (cured)	" "	3 days	" "	1-2 months
Sausage, country style	" "	2-3 days	" "	1-2 months
Beef or Pork				
Variety meats	" "	1-2 days	" "	3-4 months
Ready-to-serve:				
Bologna	Wrapped 7	7 days		
Luncheon meat	Wrapped 3	3-5 days		
Frankfurters and weiners	Wrapped	7 days	Freezer wrapped	2 weeks
Beef or Pork (cooked)	Tightly closed	3-4 days	Freezer wrapped	2-3 months
Poultry				
(raw)**	Loosely wrapped	2 days	Freezer wrapped	12 months
(cooked)	Tightly closed	2 days	" "	6 months
Fried chicken	" "	2 days	" "	4 months

*Frozen cured meat loses quality sooner than most meats.
**Do not stuff poultry before freezing.

Fish				
Fresh	Wrapped	2 days	Freezer wrapped	6-9 months
Frozen - purchased		Not recommended	Freezer wrapped	1-2 months
Frozen - home		Not recommended	" "	6-9 months
Cooked	Closed container	3-4 days	" "	1 month
Eggs				
Whole*	In carton	1-2 weeks	Freezer container	9-12 months
Yolk**	Cover with water	2 days	" "	9-12 months
White***	Tightly covered	2 days	" "	9-12 months
Hard cooked	In shell	2-3 days		

Canned Meat
Maintains quality for 1 year. It is safe to eat as long as cans are airtight. Store in cool place - Warm storage may cause change in color and flavor.

Dry Beans and Peas
Store dry beans and peas in tightly covered containers in a cool, dry place.

*To freeze, blend egg yolk and whites; put through mesh strainer. Add one-half tablespoon corn sirup or sugar, or ½ teaspoon salt for each cup of egg. Blend. Freeze in air-tight container.
**To freeze egg yolk, put through mesh strainer. Add 1 tablespoon corn sirup or sugar or ½ teaspoon salt for each cup of egg yolk. Blend. Freeze in airtight container.
***Blend egg whites, put through a medium mesh strainer. Freeze in airtight container. Egg whites keep well without addition of a sweetener or salt.

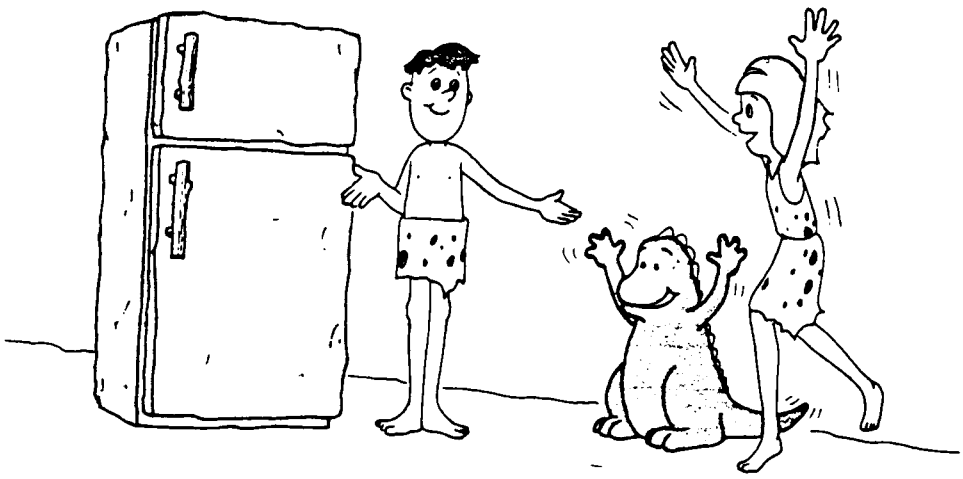
MILK AND MILK PRODUCTS - STORAGE PERIOD

FOOD	REFRIGERATOR 35-40°F		FREEZER 0° F	
	CARE	TIME	CARE	TIME
Milk				
Fresh*	Store carton	5-7 days	Original container unopened	1-3 months
Dry-nonfat**	Original container	5-6 months	Freezer wrapped	10-12 months
Dry-nonfat (reconstituted)	Closed container	3-5 days		
Evaporated (opened)	Covered	3-5 days		
Cream (pressurized, whipped)	Original carton	Few weeks		
Cream, table & whipping	" "	5-6 days		
Cream, whipped	Covered	2-3 hours		
Sour cream	Original carton	4-5 days		
Butter	Wrapped	2-4 months	Freezer wrapped	6-8 months
Cheese (soft)				
Cottage or Farmers	Covered	3-5 days		
Cream	Wrapped	2 weeks		
Pot	Wrapped	3-5 days		
Cheese (hard)				
Cheddar	Wrapped	Several months	Freezer wrapped	6 months
Swiss	Wrapped	Several months	small package	6 months
Other	Wrapped	Several months	½-1 pounds	6 months
Cheese Spreads				
Opened	Closed	Several weeks	Not recommended	
Cheese Foods				
Opened	Closed	Several weeks	Not recommended	

*Milk may be frozen but quality deteriorates.

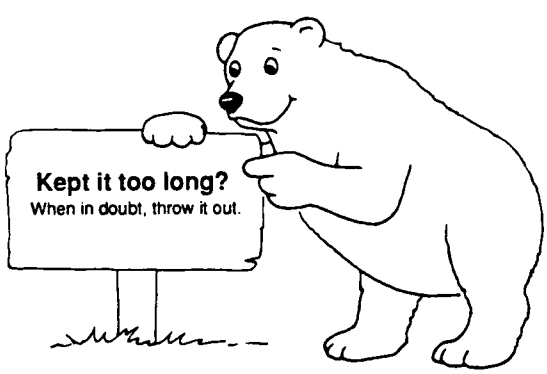
**Non-fat dry milk will keep 2 to 4 months when stored in original container at room temperature. Store dry whole milk in the refrigerator.

Frozen Desserts				
Pies (commercial)	Not recommended		Freezer wrapped	6 months
Pies (home made)	" "		" "	1 month
Ice cream and ice milk	" "		" "	1-2 months



VEGETABLES - STORAGE PERIOD

FOOD	REFRIGERATOR 35-40° F		FREEZER 0° F	
	CARE	TIME	CARE	TIME
Asparagus	Washed, dried, in crisper or plastic bag	2 days	Blanched, Freezer container	8-12 months
Beans, snap	" " "	3-5 days	" "	" "
Broccoli	" " "	1-2 days	" "	" "
Cabbage	" " "	1-2 weeks	" "	" "
Carrots	" " "	" "	" "	" "
Cauliflower	" " "	3-5 days	" "	" "
Celery	" " "	" "	" "	" "
Cucumbers	" " "	" "	Not recommended	
Leafy Greens	" " "	1-2 days	Blanched, Freezer container	8-12 months
Lettuce	" " "	5-7 days	Not recommended	
Salad Greens	" " "	1-2 days	" "	
Okra	" " "	3-5 days	Blanched, Freezer container	8-12 months
Pepper	" " "	" "	Freezer container	" "
Corn (unhusked)	In refrigerator	1-2 days	Husked, blanched Freezer container	" "
Peas (in pod)	In refrigerator	" "	Shelled, blanched freezer container	" "
Squash	In crisper	5-6 days	Blanched, or cooked Freezer container	" "
Tomatoes (fresh)	" "	" "		
Tomatoes (cooked)	Covered container	3-5 days	" "	" "
Canned vegetables (opened)	" "	2-3 days	Freezer container	2-3 months
Canned vegetables (unopened)	Will keep indefinitely stored in a cool place. Use within 1 year for optimum flavor. Discard food if cans or jars show signs of food spoilage.			
Dried fruits and vegetables	Store in tightly covered container in cool, dry place.			



MISCELLANEOUS - STORAGE PERIOD

FOOD	SHELF		REFRIGERATOR 35-40°F		FREEZER 0° F	
	Care	Time	Care	Time	Care	Time
Acid Foods Which Have Been Opened						
Pickles, catsup, etc.			Closed	Few weeks		
Coffee						
Ground, vacuum packed	Seal unbroken	1 year	Seal unbroken	12-18 months	Seal unbroken	Indefinitely
Ground, bag	Original seal	Gradual deterioration	Original seal	Slow deteriation	Freezer bag	6-12 months
Freeze dried	Original seal	1-2 years				
Instant	Original seal	1-2 years				
Coffee creamer	Closed, in cool place	Several weeks				
Leavening Agents						
Baking powder	Closed	Indefinitely				
Soda	"	"				
Yeast, dry granulated	"	3 months				
Yeast, fresh, compressed			Wrapped	2-6 weeks		
		Not recommended				
Mixes						
Cake, Muffin, others*	Closed, in cool, dry place					

**Store mixes in a cool, dry place. Ingredients used determines storage life.*

Nuts (most kinds)						
In shell	Cool, dry place	6 months	Closed container	6 months	Freezer container	9-12 months
Shelled	Closed container, cool, dry place	2-3 months	" "	6 months	" "	" "
Salted	" "	2-3 months	" "	6 months	" "	" "
Spices	Closed, in cool dry place	6-12 months				
Sirup	" "	Indefinitely				
Sugar	" "	"				

APPENDIX L

Pamphlet: A Quick Consumer Guide to Safe Food Handling

THE UNIVERSITY OF TENNESSEE
AGRICULTURAL EXTENSION SERVICE

PB 1420

A Quick Consumer Guide To Safe Food Handling

For more information on food handling, call USDA's Meat and Poultry Hotline

1-800-535-4555

10–4 weekdays Eastern Time



For more information contact:
Gail W. Disney, Associate Professor and Leader
Food, Nutrition and Health

How this booklet was developed. USDA's Food Safety and Inspection Service asked food scientists to analyze consumer handling of food in the home using a HACCP (Hazard Analysis and Critical Control Point) approach. This booklet, the result of that effort, guides you past those critical points in everyday food handling where experts say making the "wrong" move could lead to foodborne illness.

PB1420-5M-11/93(Rep) E12-2015-00-179-94
A State Partner in the Cooperative Extension System
The Agricultural Extension Service offers its programs to all eligible persons regardless of race, color, national origin, sex, age or disability and is an Equal Opportunity Employer.
COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
The University of Tennessee Institute of Agriculture, U.S. Department of Agriculture, and county governments cooperating in furtherance of Acts of May 8 and June 30, 1914. Agricultural Extension Service Billy G. Hicks, Dean

This booklet tells you what to do at each step in food handling—from shopping through storing leftovers—to avoid food poisoning.

Never had poisoning? Actually, it's called foodborne illness. Perhaps you have, but thought you were sick with the flu. Some 7 million Americans will suffer from foodborne illness this year.

Why? Because at the right temperature, bacteria you can't see, smell or taste can multiply to the millions in a few short hours. In large numbers, they cause illness.

It doesn't have to happen, though. Some 85 percent of cases could be avoided if people just handled food properly. So here's what to do . . .

When You Shop

Buy cold food last, get it home fast

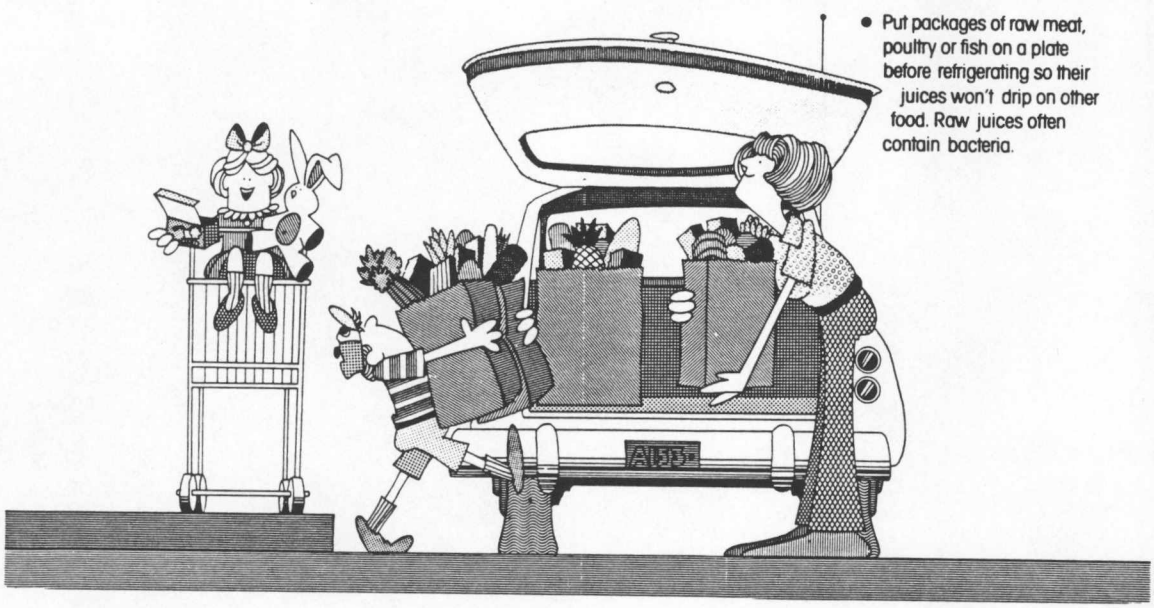
- When you're out, grocery shop last. Take food straight home to the refrigerator. *Never leave food in a hot car!*
- Don't buy anything you won't use before the use-by date.
- *Don't buy food in poor condition.* Make sure refrigerated food is cold to the touch. Frozen food should be rock-solid. Canned goods should be free of dents, cracks or bulging lids which can indicate a *serious* food poisoning threat.

When You Store Food

Keep it safe, refrigerate

Check the temperature of your refrigerator with an appliance thermometer you can buy at a variety or hardware store. To keep bacteria in check, the refrigerator should run at 40° F; the freezer unit at 0° F. Generally, keep your refrigerator as cold as possible without freezing your milk or lettuce.

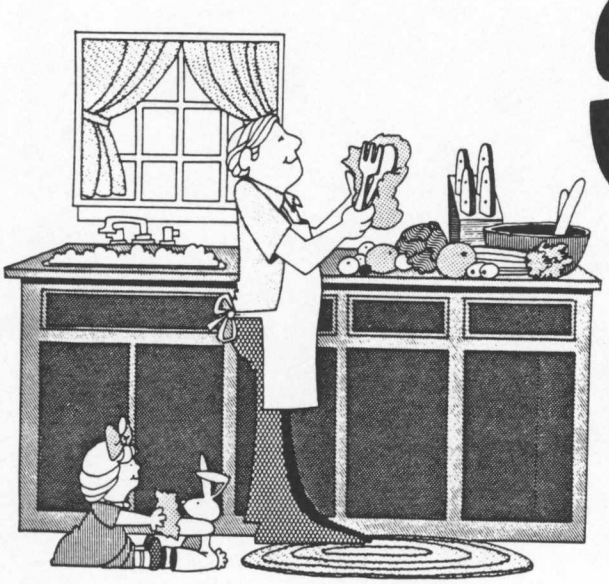
- Freeze fresh meat, poultry or fish immediately if you can't use it within a few days.
- Put packages of raw meat, poultry or fish on a plate before refrigerating so their juices won't drip on other food. Raw juices often contain bacteria.



When You Prepare Food

Keep everything clean, Thaw in refrigerator

- Wash hands in hot soapy water *before* preparing food and *after* using the bathroom, changing diapers and handling pets.
- Bacteria can live in kitchen towels, sponges and cloths. Wash them often. Replace sponges every few weeks.
- Keep raw meat, poultry and fish and their juices away from other food. For instance, wash your hands, cutting board and knife in hot soapy water after cutting up the chicken and before dicing salad ingredients.
- Use plastic cutting boards rather than wooden ones where bacteria can hide in grooves.
- Thaw food in the microwave or refrigerator, NOT on the kitchen counter. The danger? Bacteria can grow in the outer layers of the food before the inside thaws. Marinate in the refrigerator too.



When You're Cooking

Cook thoroughly

It takes thorough cooking to kill harmful bacteria, so you're taking chances when you eat meat, poultry, fish or eggs that are raw or only partly cooked. Plus, hamburger that is red in the middle, rare and medium-rare steak and roast beef are also undercooked from the safety standpoint.

- Cook red meat to 160° F. Cook poultry to 180° F. Use a meat thermometer to check that it's cooked all the way through.
- To check visually, red meat is done when it's brown or grey inside. Poultry juices run clear. Fish flakes with a fork.
- Salmonella, a bacteria that causes food poisoning, can grow inside fresh, unbroken eggs. So cook eggs until the yolk and white are firm, not runny. Scramble eggs to a firm texture. Don't use recipes in which eggs remain raw or only partially cooked.
- When you cook ahead, divide large portions of food into small, shallow containers for refrigeration. This ensures safe, rapid cooling.

Safe Microwaving

A great timesaver, the microwave has one food safety disadvantage. It sometimes leaves cold spots in food. Bacteria can survive in these spots. So . . .

- Cover food with a lid or plastic wrap so steam can aid thorough cooking. Vent wrap and make sure it doesn't touch the food.
- Stir and rotate your food for even cooking. No turntable? Rotate the dish by hand once or twice during cooking.
- Observe the standing time called for in a recipe or package directions. During the standing time, food finishes cooking.
- Use the oven temperature probe or a meat thermometer to check that food is done. Insert it at several spots.

When You Serve Food

Never leave it out over 2 hours

- Use clean dishes and utensils to serve food, not those used in preparation.

Serve grilled food on a clean plate too, not one that held raw meat, poultry or fish.

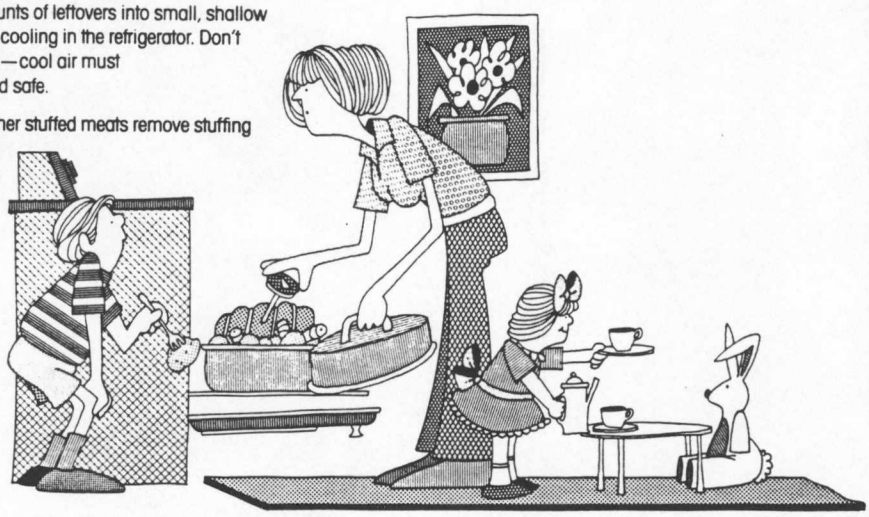
- *Never leave perishable food out of the refrigerator over 2 hours!* Bacteria that can cause food poisoning grow quickly at warm temperatures.
- Pack lunches in insulated carriers with a cold pack. Caution children never to leave lunches in direct sun or on a warm radiator.
- Carry picnic food in a cooler with a cold pack. When possible, put the cooler in the shade. Keep the lid on as much as you can.
- Party time? Keep cold party food on ice or serve it throughout the gathering from platters from the refrigerator.

Likewise, divide hot party food into smaller serving platters. Keep platters refrigerated until time to warm them up for serving.

When You Handle Leftovers

Use small containers for quick cooling

- Divide large amounts of leftovers into small, shallow containers for quick cooling in the refrigerator. Don't pack the refrigerator—cool air must circulate to keep food safe.
- With poultry or other stuffed meats remove stuffing and refrigerate it in separate containers.



Reheating

- Bring sauces, soups and gravy to a boil. Heat other leftovers thoroughly to 165° F.
- Microwave leftovers using a lid or vented plastic wrap for thorough heating.

Kept it too long?

When in doubt, throw it out

Safe refrigerator and freezer storage time-limits are given for many common foods in the "Cold Storage" table inside this booklet. But what about something you totally forgot about and may have kept too long?

- *Danger—never taste food that looks or smells strange* to see if you can still use it. Just discard it.
- Is it *Moldy?* The mold you see is only the tip of the iceberg. The poisons molds can form are found *under* the surface of the food. So, while you can sometimes save hard cheese and salamis and firm fruits and vegetables by cutting the mold out—remove a large area around it, most moldy food should be discarded.

APPENDIX M

Definition of Terms

Definition of Terms

Child care center: A child care center is any place operated by a person, society, agency, corporation, institution or any other group wherein are received for pay thirteen (13) or more children under seventeen (17) years of age for group care for less than twenty-four (24) hours per day without transfer of custody (Tennessee Code S14-10-101).

Eligible child care centers: For this study, eligible child care centers were selected from the current list of licensed child care centers provided by the Tennessee Department of Human Services Day Care Licensing Unit. For participation in this study, a child care center must have used on-site food production facilities, with daily food production involving more than only snacks.

Rural counties: From the 15 counties in Tennessee District One, as defined by Day Care Licensing, the 7 counties contiguous with Knox County (Anderson, Union, Grainger, Jefferson, Sevier, Blount and Loudon) represented the rural population. The population density for each county was less than 200 persons/square mile (28).

Urban county: The urban county used in this study was Knox County, with a population density of 684 persons/square mile (28).

Child care center director: The center director was identified as the individual responsible for day to day operations, scheduling and supervising of staff.

Food production staff member: The child care center's food production staff member was the individual responsible for the daily production of the children's snacks and meals.

Research project team members: Graduate students in the Department of Nutrition, with certification in food protection or extensive experience ($\geq$ 10 years) in the foodservice industry, completed the data collection. Additional training for completion of the center assessment checklist and questionnaires was provided by the project team leader.

National Health and Safety Performance Standards: Guidelines for Out-of-Home Child Care Programs: For this study, standards were drawn from the Nutrition and Food Service chapter, sections 4.6-4.9. Standards NU53 and NU68 were excluded because of dependence upon United States Department of Agriculture, National Sanitation Foundation and Food and Drug Administration standards for equipment and sanitation.

Assessment Checklist (AC): This data collection tool was developed from the standards contained in the *National Health and Safety Performance Standards* as defined above. This form was completed through visual observation, with all recorded data as '1' for yes, '0' for no and '9' for not applicable (Appendix C).

Food Production Practices Questionnaire (FPPQ): This data collection tool was developed from the standards in the *National Health and Safety Performance Standards* as defined above. This form was completed by asking questions of the center staff member responsible for food production. Responses were converted to either '1' for yes, '0' for no, or '9' for not applicable (Appendix D)

Director's Perception of Safe Foodservice Conditions (DPSFC): This data collection tool was developed to assess the director's perception of: existing foodservice conditions at the center (question 1), importance of maintaining safe foodservice conditions (questions 3-9) and staff training needs. Questions relating to foodservice conditions were likert like scales and those relating to training needs were 'yes / no' format.

Foodservice sub-topics: [A]quantity food production, [B]handwashing/personal hygiene, [C]safe food storage, [D]dishware and utensils, [E]chemical storage, [F]kitchen cleanliness and repair and [G]kitchen safety.

Foodservice sub-topic scores: All of the questions contained on AC and FPPQ were categorized into the seven foodservice sub-topics. The maximum potential score for each of the topics was as follows: A=20, B=9, C=30, D=15, E=5, F=24, G=11. The questions from the AC and FPPQ were summed and converted to percentages of the maximum potential scores for each of the sub-topics to arrive at the sub-topic scores.

Center score: The center score was a summation of the seven foodservice sub-topics, calculated by summing the seven sub-topic scores and converting to a percentage of the maximum potential score of 114.

VITA

Todd Kirkpatrick was born in New Albany, Ohio on September 30, 1970. He attended the Gahanna-Jefferson public school district from kindergarten through high school graduation in 1989. His college career began at the University of Utah in Logan, Utah where he studied food science. During his sophomore year he transferred to Ohio University in Athens, Ohio, to study nutrition. He received a Bachelor of Science degree in Dietetics/Community Nutrition from Ohio University in June of 1993.

Following graduation, he worked at the Columbus Children's Hospital and Franklin County WIC Program. In the spring of 1994, he entered the University of Tennessee-Knoxville AP4 program, a combination of dietetic internship and Master's degree program. Following acceptance to the program, he received a Maternal and Child Health Traineeship for Graduate Study in Public Health Nutrition. He completed the AP4 program in the summer of 1995 and Master of Science in Nutrition (public health nutrition emphasis) in the fall of 1995. He plans to take the dietetic registration examination in the spring of 1996.