

CHAPTER 16 PRODUCTION

GENERAL

Production schedules, recipes, cooking methods, and procedures and the use of herbs and spices are discussed in this chapter. Also covered are the use and care of kitchen utensils.

PRODUCTION SCHEDULE

The primary tool used for the daily scheduling of meals is the DA Form 3034. This form provides all the information a cook needs for preparing a meal. Figure 16-1 (page 16-2) is a sample production schedule which illustrates the following:

- Food items to be prepared and served.
- Name of cook who is to prepare each item.
- Portions to prepare.
- Portions actually prepared.
- Recipe numbers from TM 10-412 or other source.
- Time to start preparing or cooking each item.
- Special instructions for preparing, cooking, or serving a particular item.
- Leftovers to be used in subsequent meals.
- Leftovers to be discarded.
- Comments on how saved leftovers will be used, why leftovers were discarded, or number of seconds served.
- Any other information not covered.

SENSITIVE AND HIGH-DOLLAR ITEM DISPOSITION

The FSS must document the use of sensitive (coffee) and high-dollar (meat) items each day. DA Form 3034-1 is used to record the disposition of all meat, fish, poultry, commercial pastries, and coffee. MACOM and installation commanders may require the addition of other items when considered necessary. The DA Form 3034-1 is prepared by the FSS at the same time that the production schedule is prepared. (See AR 30-1.) Figure 16-2 (page 16-4) is a sample DA Form 3034-1.

RECIPES

Recipes are instructions that explain how to prepare a food product. Army recipes are in TM 10-412. The Master Menu also includes additional recipes and supplemental instructions for preparing items not contained in TM 10-412. Food service personnel must refer to these recipes and instructions for quantities of ingredients; methods of combining; cooking methods, times, and temperatures for cooking; and the number and size of servings the recipes will yield. They also must be able to convert measurements in recipes to prepare a desired number of servings. Many recipes contain informational notes on how to prepare an item or a variation using alternate methods or equipment. The FSS should indicate any notes that the cook is to follow in the special instructions column of the production schedule.

Using Recipe Cards

Recipes should be followed carefully. Use the following procedures as a guide:

- Read the recipe card before starting to cook. If any cooking terms or methods are new, ask for assistance.
- Assemble all utensils and ingredients you need. Measure or weigh the ingredients accurately.
- Preheat cooking equipment only long enough to reach the temperature given on the recipe card.
- Follow the recipe card in setting up the equipment you are going to use.
- For successful results, follow preparation procedures exactly as stated on the recipe cards.
- Follow directions for removing cooked products from the cooking utensil. Be careful while handling and serving the finished product.

PRODUCTION SCHEDULE		DATE		NO. TO PREPARE		NO. SERVED	
Per use of this form, see AR 30-1; the preparation agency is DCELOG.		3 JUN 90		300		327	
ORGANIZATION		SERVING PERIOD		LEFTOVERS/DISCARDS		SPECIAL INSTRUCTIONS	
#11B 4/64th ADA		BEGIN 1130 END 1300					
PERSON ASSIGNED	MENU ITEMS	RECIPE, SOP OR MASTER MENU NOTE	ESTIMATED PORTIONS TO PREPARE	PREP AND COOKING TIME	PORTIONS ACTUALLY PREPARED		
PATTON	BAKED CHICKEN	L-143	100	0900	100		
PATTON	BRAISED PORK CHOPS	L-85	100	0945	100	12	USE FOR DINNER 3 JUN 90
PATTON	CHICKEN GRAVY	D-16-2	150	1045	150	16	
SMITH	STEAMED RICE	E-5	100	1045	100		
SMITH	MASHED POTATOES	Q-57	100	1100	125	6	
WAGNER	SEASONED BROCCOLI ^{CAULIFLOWER}	Q-G-3	100	1045	100		
WAGNER	SEASONED CORN	Q-B-1	100	1100	125	3	USE 14 ser 40 Bacon FROM BAK 3 JUN 90
WOODS	SALAD BAR	SOP-12					
	MACARONI-SALAD	M-34	75				
Woods	ASSORTED SALAD DRESSING	SOP-13					
Woods	ASSORTED CONDIMENTS	SOP-14					
SMALE	ASSORTED BREADS	SOP-4					
WASNIENSKI	WHITE CAKE W	G-30	100	0300	108		
WASNIENSKI	CHOCOLATE FROSTING	G-50	100	0400	108		
WASNIENSKI	CHERRY PIE	I-21	100	0030	104	16	USE FOR DINNER 3 JUN 90
SMALE	MILK	SOP-1					
<small>*Indicate in red ink "leftover" in black/blue ink "discarded".</small> FOOD SERVICE SERGEANT SIGNATURE AND GRADE: <i>David E. Swamy SSG</i> FOOD SERVICE OFFICER SIGNATURE AND GRADE: <i>John A. Woods Jr LT</i>		SHIPT LEADER SIGNATURE AND GRADE: <i>David E. Swamy SSG</i> SHIPT LEADER SIGNATURE AND GRADE: <i>John A. Woods Jr LT</i>		U.S. GOVERNMENT PRINTING OFFICE : 1985 O - 155-569 (30504) DA FORM 3024, AUG 84			

Figure 16-1. Sample production schedule

Adjusting Quantities

The recipes in TM 10-412 are based on 100 servings. Recipes may be increased or decreased by following the conversion charts in TM 10-412 under general information. The cook may calculate the quantities of ingredients required and write the adjusted quantities on the recipe card in pencil.

Changing Seasonings

The FSS may change seasonings or specified quantities of seasonings in a recipe based on experience, training, and diner preference. Always make sure the changes will be acceptable to the diners.

Using Standardized Measurements

Success in cooking requires accuracy at all times. Table 16-1 (page 16-6) shows units of measure commonly found in recipes, lists their abbreviations, and shows their equivalents in other units of measure. Table 16-2 (page 16-7) shows you how to convert measurements from one to another. Accuracy results when ingredients are carefully weighed or measured. To ensure accuracy, scales should be properly calibrated. If scales are not available, ingredients can be measured using the procedures below.

Dry ingredients. Place dry ingredients, such as flour, granulated sugar, and dried milk, in the measuring utensil. Level the ingredients with the straight edge of a knife. If using a recipe that calls for sifted flour or when measuring by volume, sift the flour first. If a sifter is not available, loosen the flour with a hand whip before you measure it. Stir dried milk and meal lightly with a fork or spoon, but do not sift them. Sift granulated sugar only if it is lumpy.

Brown sugar. Pack brown sugar firmly into the measuring utensil. If the sugar is lumpy, break lumps with a rolling pin before measuring it.

Baking powder and spices. Stir baking powder and spices lightly before measuring them. First overfill the spoon, then level the contents of the spoon with the straight edge of a knife.

Solid shortening. Press shortening firmly into the measuring utensil. Level the contents of the spoon with the straight edge of a knife. An alternative method for measuring solid shortening is to use a larger-than-required utensil in which a portion of liquid has been added. Then add the shortening required by the recipe.

Liquids. When measuring liquids, place the measuring utensil on a level surface and fill to the mark which indicates the amount required. Do not overfill this type of utensil.

Using Mixing Methods

Use the mixing method given in the recipe. If you substitute one method for another, the results may not be satisfactory.

Stirring. Stirring is moving ingredients in a circle with a utensil such as a spoon or paddle. Use mechanical mixers for mixing large batches. Set the mixer for slow or medium speed so that the speed of the beaters will be equivalent to the speed of hand stirring. Select a low speed for mixing a thin liquid into a thick one. Also, make sure the mixing container is large enough to prevent spilling.

Beating. Beating is making a mixture smooth by moving a utensil in a fast, regular, circular motion to incorporate air into a product. Products can also be beaten in a mixing machine with the beater accessory.

Whipping. Whipping is combining ingredients rapidly with a wire whip to increase the volume by incorporating air.

Folding. Folding is incorporating an ingredient into a mixture by gentle turning the item over without stirring or beating the mixture.

Table 16-1. Measurement equivalents

UNIT	ABBREVIATION	EQUIVALENT
gallon	gal	4 quarts
quart	qt	2 pints
pint	pt	2 cups
cup	c	8 fluid ounces
fluid ounce	fl oz	1/8 cup, 2 tablespoons
tablespoon	tbsp	1/2 fluid ounce, 3 teaspoons
teaspoon	tsp	1/6 fluid ounce, 1/3 tablespoon

STANDING OPERATING PROCEDURES

SOPs must be written to provide detailed instructions for those menu items not listed in TM 10-412. For many FSSs this can be a difficult, time-consuming task. Many things must be taken into consideration when preparing an SOP for dining facility operations.

SOPs must be based on the type of equipment available. While some facilities may have bread dispensers, soft-serve ice cream dispensers, automatic meat slicers, and so forth, others may not. Each SOP would have to address the conditions of the facility for which it was developed.

SOPs must also consider the number of personnel that the facility supports. The average number of personnel subsisted in the facility will indirectly define the amounts of a particular item with which the FSS will want to start the serving period. If your facility serves 300 per meal and the item you are preparing is frozen orange juice (32-ounce can), you might indicate to prepare 12 cans for the start of the meal serving period and then replenish as needed. However, if your facility serves 35 per meal, you would most likely start with only two cans of juice.

Appendix C provides a sample SOP that can be tailored for use in your dining facility to save time

and effort. Remember, each operation is somewhat different. Think out your instructions and make them as simple and direct as possible. The newest most inexperienced member of your team must be able to understand how you want each item prepared. When preparing your SOP, group together similar items such as butter patties with melted butter; jams, jellies, individual servings of dressings with jar types and sizes; bulk milk with 1/2 pints and eggnog, and so on.

SOPs must be updated as changes occur. For example, include changes in meal service hours, prices, or number of diners supported.

COOKING METHODS

The two basic methods used to cook foods are moist heat and dry heat. You may also have to combine methods to prepare a food item. For example, some recipes call for panfrying followed by braising. These methods are introduced below and discussed in Chapter 18. Terms are fully explained in the glossary.

Moist Heat

Foods cooked by this method are simmered, stewed, boiled, or steamed. This type of cooking is done in a liquid (except fat) or in steam.

Dry Heat

Foods cooked by this method are broiled, roasted, baked, grilled, panfried, deep-fat fried, or pan-broiled. This type of cooking is done without adding a liquid (except fat).

KITCHEN UTENSILS

Use the correct utensils for best results. The following guidance will help in utensil selection:

Pots and Pans

Pots and pans come in many sizes and types. Select the proper size and type for the recipe you are using. Clean them thoroughly before and after each use.

Table 16-2. Measurement conversion

FROM TO	GAL	QT	PT	C	FL OZ	TBSP	TSP
GAL		Divide by 4	Divide by 8	Divide by 16			
QT	Multiply by 4		Divide by 2	Divide by 4			
PT	Multiply by 8	Multiply by 2		Divide by 2			
C	Multiply by 16	Multiply by 4	Multiply by 2		Divide by 8	Divide by 16	
FL OZ		Multiply by 32	Multiply by 16	Multiply by 8		Divide by 2	Divide by 6
TBSP				Multiply by 16	Multiply by 2		Divide by 3
TSP					Multiply by 18	Multiply by 3	

HOW TO USE THIS TABLE

To convert a measurement from one unit to another, find the given unit in the top row and the desired unit in the left column. Find the box where the row and the column meet, and perform the mathematical computation. The result is an equal amount in the desired unit. For example, to convert 6 ounces to tablespoons, find the block where the FL OZ column meets the TBSP row. The instruction is to multiply by 2.

Example: $6 \times 2 = 12$, so 6 FL OZ equal 12 tablespoons.

Knives

Each knife is designed for a certain job and should be used only for that job. Table 16-3 (page 16-8) shows the knives most frequently used.

Sharpening. Sharpen knives on a medium-fine-grade Carborundum oilstone. Never grind a knife on a power- or hand-driven stone because this treatment will remove the temper from the cutting edge. The correct way to sharpen a knife with a mounted sharpening stone is shown in Figure 16-3 (page 16-9). If the entire stone is used for sharpening the knife, the stone will not “hollow-out” at a particular spot. Do not use a newly

sharpened knife until the blade and handle are thoroughly cleaned.

Steeling. After the knife is sharpened on a stone, the blade must be trued with a butcher’s steel. There is a technique to handling the steel, which you can master with practice. Procedures for steeling a knife are shown in Figure 16-4 (page 16-9).

Thermometers

Thermometers take the guesswork out of cooking. The recipes indicate when you should use them.

Avoid using mercury-filled glass thermometers in storing, handling, preparing, or serving subsistence in any dining facility. If the glass breaks, mercury and glass could contaminate the food. There are many types of metal thermometers available for use in dining facilities.

Oven thermometer. Ranges are equipped with regulators and thermostats. They control the oven temperature so foods can be baked at an even heat. However, the oven thermostat should be calibrated periodically to verify the temperature. Even if an oven has a thermostat, place an oven thermometer inside it during the baking process to make sure that correct temperatures are used.

Deep-fat thermometer. Use a deep-fat thermometer for deep-fat frying. The thermometer will show when the fat has reached the correct temperature for cooking a particular food. It will also show the temperature of the fat throughout the cooking process. During the cooking process, use a thermometer to verify the accuracy of the thermostat on the deep-fat fryer. Place the probe

below the surface of the melted fat, but do not let it touch the bottom of the container.

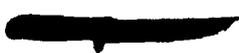
Refrigerator thermometer. Use a metal thermometer in refrigerators to determine if the proper temperature is being maintained. TB MED 530 gives allowable temperature ranges. Glass thermometers should not be used.

Meat thermometer. A meat thermometer is the most dependable way to determine when a meat or poultry food item has reached the desired degree of doneness. When the center of the meat reaches the temperature specified in the recipe, the meat is done.

Surface temperature thermometer. Use the surface temperature thermometer to check grill surface cooking temperatures. Check the temperature at several spots on the grill to make sure the temperature is uniform across the entire grill surface.

NOTE: DO NOT use mercury-filled glass thermometers in your dining facility!

Table 16-3. Knives used in a dining facility

KNIFE	TYPE	USE	DESCRIPTION
	Boning knife	Cutting through joints. Cutting close around bones to separate the meat from the bones.	Short, narrow, stiff blade; narrow bevel*.
	Steak knife	Cutting steaks and roasts.	Long, wide blade; wide bevel*
	Paring knife	Peeling fruits and vegetables.	Small, narrow blade; narrow bevel*.
	Cooks' knife	Cutting, slicing, dicing, or chopping.	Large, wide blade; wide bevel*.
*The bevel is the part of the blade sharpened to make the cutting edge of the knife.			

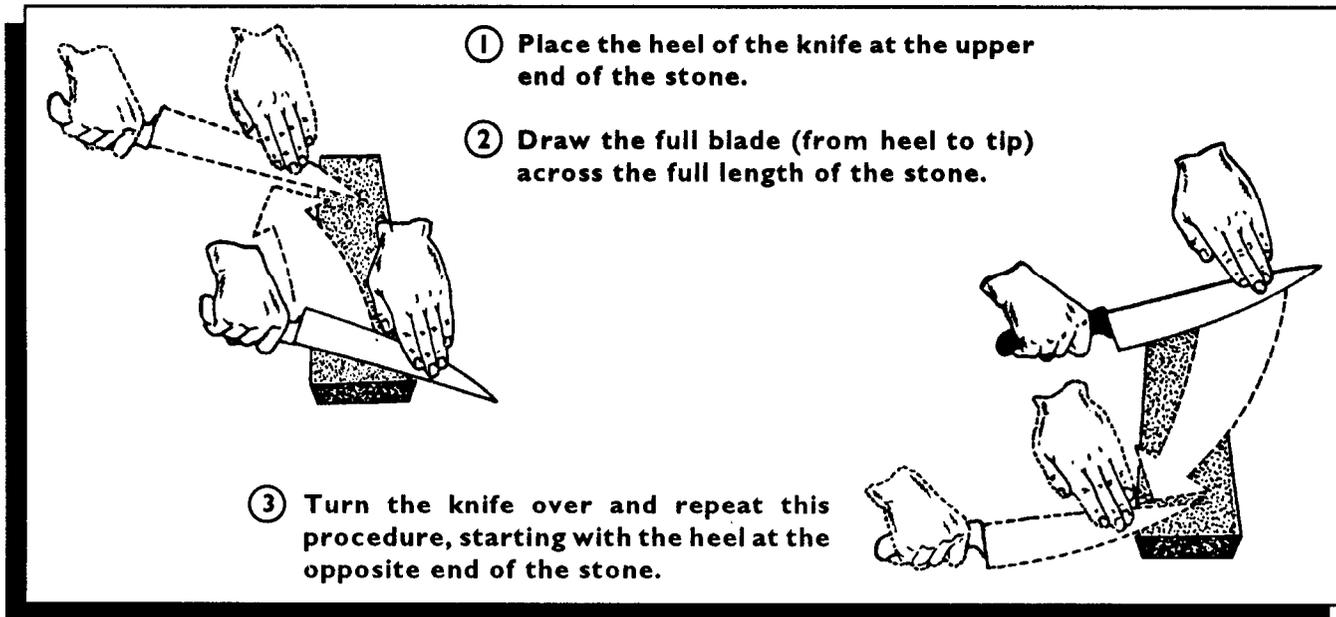


Figure 16-3. Sharpening a knife

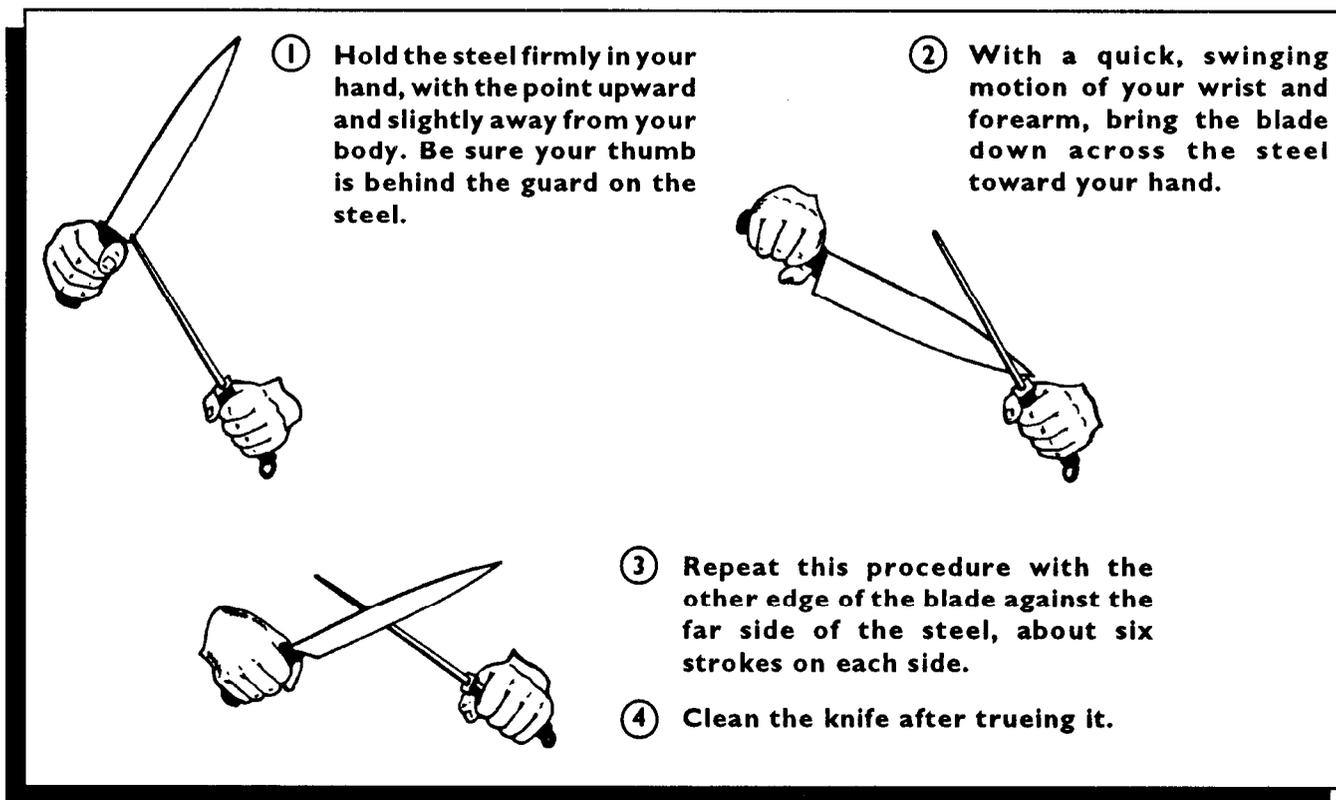


Figure 16-4. Steeling a knife

Miscellaneous Kitchen Items

Miscellaneous kitchen items and their care are described below.

Wire whips, meat tenderizers, vegetable graters, sieves, rolling pins, and colanders gather food particles easily. Wash these items in hot water and detergent, then rinse, sanitize, and let them air-dry.

Use only authorized cleansers on stainless steel or chromium-plated utensils. Do not use harsh scouring powder. You can remove mild discoloration on stainless steel with vinegar and salt or with lemon juice.

To calibrate the 10-pound scale, keep the scale tray on the scale and remove the scale plate by turning it counterclockwise. Add or remove metal pellets to balance the scale.

GARNISHES

Garnishes do much to make a meal attractive. Information on making specific garnishes may be obtained from the USAQMC&S. In garnishing food, there are several guidelines to follow:

- Plan and prepare garnish ahead of time. Do not wait until the food is ready to go to the serving line and then toss on a garnish as an after thought.
- Use a garnish that is eye-appealing in shape, color, and texture.
- Always use a garnish that is edible.
- Do not overgarnish.
- Do not garnish foods that have a “built-in” garnish. For example a tossed vegetable salad or a cake iced with a frosting that complements the color and flavor of the cake needs no garnish.
- Garnish only food items, not the serving line or service table.

SEASONING

Use salt, spices, and herbs to enhance the flavor of foods. These are described in this paragraph.

Salt

Salt is an important seasoning used in preparing foods. It is a standard ingredient in most recipes. Salt brings out the natural food flavor. Even carbohydrate foods, such as candy, require some salt. Foods that have distinctive flavors require less salt than those that do not. Exercise caution and do not overseason.

Flavored Salts

Flavored salts are a blend of ground seasoning and table salt. Celery salt is a blend of salt and ground celery seed. Onion salt is a blend of salt and onion powder, a ground product of dehydrated onions. Garlic salt is a blend of garlic powder, a ground product of dehydrated garlic. Use flavored salts in salads, salad dressings, stews, tomato dishes, sauces, and soups. With meat dishes, use garlic and onion salts; with fish dishes, use celery salt.

Spices and Herbs

Tables 16-4 (page 16-1 1) and 16-5 (page 16-12) list some popular spices, blends, and herbs and give their uses.

LEFTOVERS

Careful menu planning, preparation, and serving should keep leftovers to a minimum. If practical, do not serve a leftover item in its original form. For example, you can slice baked ham and roast turkey or beef and use them as cold cuts. Or you may add turkey, veal, and other meat items to salads. You can also combine leftover meats with sauces or gravies or with other leftover vegetables for individual pot pies, stews, or casseroles. Potatoes may be used in these dishes as well as in potato salads or potato pancakes. You can combine vegetables as stated above, or you can serve them with a sauce or mixed with other vegetables. Leftover salad vegetables may be kept crisp and served as part of the salad bar or combined with other vegetables to form a salad.

Table 16-4. Spices

SPICE	GENERAL USES
Allspice:	
Whole	Pickling, spicing meats, seasoning gravies.
Ground	Puddings, pies, cakes, relishes, tomato sauces, dressings.
Anise	Baked products, candies, puddings, sweet sauces, beverages.
Caraway seed.....	Breads and rolls, cottage and soft mild cheeses, new cabbage, turnips, chowders, pickling.
Cardamon	Baked products, vegetables, pickling.
Cayenne.....	Meats, sauces, fish, eggs, gravies, seafoods, salads.
Celery seed:	
Whole	Pickling, coleslaw, potato salad, salad dressings.
Ground	Soups, stews, tomato dishes, fish.
Chili powder (<i>blend</i>)	Mexican dishes, cocktail sauces, stews, hamburgers, egg dishes, barbecue sauces.
Cinnamon:	
Stick	Pickling, preserving.
Ground	Puddings, baked products, stewed fruits, whipped cream, hot cereals, mincemeat, mashed sweet potatoes, cinnamon toast.
Cloves:	
Whole	Garnishes for ham and pork roasts, pickling, preserving, spiced syrups, beverages.
Ground	Baked products, puddings, stews, applesauce.
Cumin seed	Soups, deviled eggs, cheese dishes, meat pies, canapes, Mexican and Oriental dishes.
Curry powder (<i>blend</i>).....	Salad dressings, chowder, scalloped tomatoes, curry sauce, curries of meat, fish, eggs, chicken.
Dill seed	Pickling, fish dishes, soups, sauces, salad dressings, sauerkraut.
Fennel seed	Soups, sauces, gravies, salads.
Garlic powder	Roasts, soups, stews, salads.
Ginger.....	Baked products, roast chicken, pot roasts, canned pears.
Horseradish	Condiments, sauces, pickling, dressings, gravies, oyster stew, fish and meat dressings, sweet sauces, chocolate desserts.
Mace	Baked products, pickling, fish sauces, gravies, oyster stew, fish and meat dressings, sweet sauces, chocolate desserts.
Mustard:	
Ground	Sauces, gravies.
Prepared	Salad dressings, ham, frankfurters, cheese.
Seed.....	Pork products, dressings, boiled beets, garnish for vegetable salads.
Nutmeg	Puddings, sauces, custards, baked products, pot pies, applesauce, doughnuts.
Paprika	Garnishes for salads, vegetables, meats, fish, goulash, salad dressings.
Pepper	General culinary purposes.
Poppy seed (<i>whole</i>)	Baked products, vegetables, vegetable salads, salad dressings.
Poultry seasonings	Meat and poultry dressings, meat loaves, omelets, hamburgers, biscuit doughs.
Pumpkin pie spice	
(<i>blend</i>)	Pumpkin dishes, cookies, buns, gingerbread, sweet potato pies.
Sausage seasonings	Meat loaves, sausages, pork products.
Sesame seed (<i>whole</i>).....	Baked products, salads, sauces, fish, meat dishes.
Tumeric	Pickling, salads, mustard sauce, meat and egg dishes.

Table 16-5. Herbs

HERB	GENERAL USES
Basil (sweet)	Tomato paste and sauces, soups, stews, meat pies, lamb dishes.
Bay leaves	Pickling, sauces, stews, soups, tomato mixtures, meat dishes, fish, chowders, boiled potatoes.
Marjoram	Poultry dressing, lamb dishes, stews, soup, hash, meat pies, scalloped potatoes, cheese dishes, sauces, sausage products.
Oregano	Pork dishes, stews, soups, meat sauces, omelets, gravies, vegetables, salads, salad dressings.
Parsley (dried flakes)	Garnishes, general culinary purposes.
Rosemary	Lamb dishes, stews, soups, dressings, fish, basting for roasts, egg dishes, potatoes, salads, salad dressings.
Saffron	Baked products, candies, stews, vegetables, sauces, coloring for beverages and foods.
Sage	Poultry and meat dressings, tomato and cheese dishes, dried beans, baked fish, salad greens, chowders, salad dressings.
Salad herbs	Salads, salad dressings, soups, stews, sauces.
Savory	Egg dishes, salads, soups, pea-bean dishes, poultry dressing, meat dishes, stews, gravies, chowders, salad dressings.
Tarragon	Sauces, salads, chicken, meats, egg dishes, tomato dishes.
Thyme	Sauces, dressing, stews, soups, chowders, salad dressings, poultry and meat (especially veal and pork) dishes.

Minimize the Size

Use small-batch preparation, progressive cooking, and knowledge of diner preferences to keep leftovers to a minimum.

Retaining Foods

Before you retain foods as leftovers, they must meet certain criteria. Food must--

- Be maintained at a safe temperature during preparation, holding, and service.
- Be protected against contamination during service by use of sneezeguards.
- Be served by an authorized individual using the proper utensils, or be individually wrapped or packaged.
- Be washed (especially hard-skinned fruit) before re-service.

Discarding Foods

Although foods may meet the above criteria to be retained as leftovers, some of these foods are unfit for re-serving. *DO NOT* retain the following items as leftovers:

- Foods which have been creamed or handled considerably (such as hashes, creamed meats, and most gravies and dressings).
- Highly perishable foods (such as most seafood).

Limitations on Leftovers

In addition to meeting criteria for retention as a leftover, there are several stipulations and limitations for holding, preparing, and serving leftovers.

Label leftover PHFs with DA Label 178 showing the date and time they were removed from service.

Retain PHF leftovers for no more than 24 hours if they are chilled to 45° F or below and no more than 5 hours if they are maintained hot (140° F or above.)

Reheat chilled leftovers intended for service to an internal temperature of 165° F. Offer leftovers one time, and then discard them.

Rules for Cooling

Potentially Hazardous Foods. Cool foods requiring refrigeration after preparation to an internal temperature of 45° F or below within four hours. Rapid cooling brings product temperatures to 70° F within two hours. Use one of the following rapid cooling methods when cooling PHFs:

- Place the food container in an ice bath and stir the food every 20 to 30 minutes.
- Portion food in shallow pans (3 inches or less) or small containers (2 gallons or less).
- Circulate cold water in a steam-jacketed kettle (where feasible).
- Store and stir food for a short time in a walk-in freezer.
- Immerse the cooking container in cold, running water while stirring the food.
- Distribute the food among several refrigerators.

During all handling, use an appropriate cover to protect food from contamination. Cover hot food to preclude any insulating dead space that would slow cooling.

FOOD-BORNE ILLNESS

Food must be protected from contamination, stored properly, and kept at the proper temperature. If it is not, the food may deteriorate and cause food-borne illness or result in loss from spoilage. Foods contaminated with disease-carrying microorganisms, toxins, or chemicals can cause illness or death.

Illness Factors

The eight most frequently cited factors involved in outbreaks of food-borne illness are--

- Failing to refrigerate foods properly.
- Failing to heat or cook foods thoroughly.
- Allowing infected food service workers to work in the facility.
- Preparing foods too far in advance of serving.
- Using raw or contaminated ingredients in foods that receive no further cooking.
- Allowing foods to remain at bacteria-incubating temperatures.
- Failing to reheat cooked foods to temperatures that kill bacteria.
- Allowing cross-contamination of cooked foods with raw items either by workers who mishandle foods or through improperly cleaned equipment.

Hazards

There are three main types of hazards associated with storing and handling foods. They are biological, chemical, and physical. The biological hazard is the most serious in the dining facility.

Biological. Bacteria will multiply quickly in the temperature “danger zone” of 45° F to 140° F. Therefore, foods susceptible to bacterial contamination should be kept outside this range as much as possible. Some food-borne illnesses and their causes are shown in Table 16-6 (page 16-14). Harmful bacteria can be killed by cooking foods to proper internal temperatures. See TB MED 530 for further guidance.

Chemical. These hazards result from the improper use of additives, poisonous metals, preservatives, and pesticides. Chemicals and metal products should be used only for their intended purpose. They should be stored properly and away from food-storage areas. Use proper containers for storing and preparing foods.

Physical. Faulty equipment can contaminate foods or be a safety hazard. Also, foods may be physically contaminated (dirt, glass fragments, and

wood splinters) when received in the dining facility. Food service personnel must constantly guard against physical contamination.

Table 16-6. Food-borne illnesses and their causes

ILLNESS	CAUSE
Staphylococcus	Improper refrigeration. Food handlers with cuts, wounds, coughs, or colds.
Botulism	Damaged cans or jars. Improper canning methods.
Salmonellosis	Poorly cooked poultry and poultry products, meats, eggs and egg products, fish, and dairy products. Cross-contamination from raw to cooked foods.
Streptococcus	Poor personal sanitation. Food handlers with coughs or colds. Food stored at the wrong temperature.
Bacillary Dysentery (Shigellosis)	Food contaminated by people, water flies, roaches, and rats.
Trichinosis	Pork or pork products not cooked to an internal temperature of 150 °F.
Clostridium Perfringens Food poisoning	Inadequately cooled and reheated meats.

Food Preparation

Food service personnel preparing foods and combining ingredients often make mistakes that can cause contamination. If temperatures are not controlled when food is prepared, held, and served, food-borne illness may result. Things to watch are described below.

Thawing. Thaw foods under refrigeration at temperatures of 45° F or below, under potable running water, or as part of the conventional cooking process. (See TB MED 530 for specific procedures.)

Correct Cooking Temperature. Although 140° F is adequate to prevent further bacterial growth, different products must reach certain internal temperatures to ensure that bacteria have been killed. Check thermometers for accuracy, and use them to ensure that proper temperatures have been reached. See Figure 16-5 (page 16-14) for required internal temperatures.

Breading. Discard all ingredients after breading food. They will have become contaminated. They should not be used again.

Poultry, poultry stuffings	165° F
Pork, pork products	150° F
Beef	145° F
Ground Beef	155° F
Seafood	140° F

Figure 16-5. Required internal temperatures