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**DIETARY PATHWAYS**  
**FOOD CONSUMPTION STUDIES**

**HANDBOOK FOR SERVING SIZE EVALUATION**

BATTELLE  NORTHWEST  
BATTELLE MEMORIAL INSTITUTE PACIFIC NORTHWEST LABORATORY  
BATTELLE BOULEVARD, P. O. BOX 999, RICHLAND, WASHINGTON 99352

0027955

**DIETARY PATHWAYS  
FOOD CONSUMPTION STUDIES**

- **Handbook for Serving Size Evaluation**

**Principal Investigator: J. F. Honstead**

**February 21, 1969**

**This study is being conducted for the  
United States  
Atomic Energy Commission  
by the  
Ecosystems Department  
Battelle-Northwest  
Richland, Washington**

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I. INTRODUCTION &  
II. INSTRUCTIONS

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# DIETARY PATHWAYS FOOD CONSUMPTION STUDIES

## Handbook for Serving Size Evaluation

### I. INTRODUCTION

The operators of various kinds of nuclear plants are responsible for assuring that people living nearby are fully protected from harmful levels of radiation that may originate at the nuclear plant. There are various kinds of nuclear radiation just as there are various ways that people may be exposed to it.

Of particular interest is the radioactive material that gets into water or foods used by people. To make sure that any radioactive materials reaching people through "food chains" are controlled to innocuous levels, nuclear plant operators carefully monitor what kinds and how much radioactivity is reaching the environs. The locally-produced foods and water supplies are analyzed regularly for radioactivity. The amount of radioactive material consumed by people living near the plant is then calculated. This helps determine the radiation exposure they receive.

An evaluation of the radiation to which people living near the Hanford plant are exposed is reported periodically. Samples of local foods and drinking water are regularly monitored and the amount people eat and drink is estimated. This helps us calculate the amount of radioactivity people consume. To improve these calculations, special diet surveys were made among adults, children, teenagers, and other population groups.

These diet surveys were supplemented

with actual measurement of radioactivity in peoples bodies by special, highly sensitive, "Whole-body counting" instruments.

The diet surveys we have made among people living near Hanford provide estimates of how frequently various foods are eaten. So far, we have been able to get a good count of the number of meals or servings eaten, however, it has not been possible to get a good estimate of the actual weight of the food. These results must be converted to weight so that we can more accurately calculate the amount of radioactivity in the diet. This handbook is designed to help obtain information concerning the specific weight of various kinds of foods eaten at a single meal, or taken as a single serving.

### II. INSTRUCTIONS

The usefulness of the results we will obtain from this survey will depend directly on the carefulness of the students serving as investigators. The information collected by you and other students will make a valuable contribution to the Hanford Environmental Evaluation Program. Those responsible for this program in the U. S. Atomic Energy Commission and Battelle-Northwest are grateful for your cooperation.

The handbook and forms to be used in this project were designed to keep the investigation as simple as possible. In spite of efforts

to think of all the problems and situations that may arise, there will undoubtedly be occasions when you will not be sure of the right way to fill in the blanks or evaluate servings. At these times please use your best judgement and proceed. It is important that you not let such uncertainties stop the whole project. There will be a large enough number of investigators so that no single mistake will make a big difference.

There are three kinds of information to obtain concerning your family's meals and eating habits. By far the most important is an evaluation of serving sizes. Next, we want you to measure the volume of drinking containers used by your family. Third, we need to know to what extent your family preserves and uses locally produced meats, fruits and vegetables.

The survey may be accomplished in a single week, using forms you will be furnished. The information is needed for all age groups making up the Tri-City population, so please complete a survey form for each member of your family; adults, teenagers, and children. You are free to choose the period during which you wish to survey your family's meals, as long as the work is completed by the deadline for your school. Each investigator is asked to survey the evening meal every day during the week, and all three meals on Saturday and Sunday.

Every member of your family may not be present at each of the meals surveyed. If a member is absent, just mark "absent" in the appropriate space on his form. Do not try to

estimate servings for absent members. Survey only members of your family actually at the table with you. Of course, you will want to complete a survey form for yourself as well. It is not necessary to identify the individual members of the family when the forms are returned, but you will need to be able to tell them apart as you use them. To do this write the name or initials in the upper corner of the form and then cut off that corner before turning in the form.

For each meal surveyed, complete the appropriate space on the form for each member of the family present at the meal. If there are guests, you need not complete a form for them unless you wish to. In advance of the meal select the forms for the family members present and write in the appropriate space the foods to be served. At this time also pick the picture in the handbook that will be most helpful in judging the size serving of each of the foods and write the picture number in the next column. Ask each member of the family to let you see the food they take so that you can judge helping sizes before they begin eating. Make as many preparations in advance of the meal as possible to avoid delaying the meal. As each type of food is served examine the portion taken by each person and judge the most appropriate serving size from the illustration in the handbook. If you are uncertain in judging between two sizes indicate both of them on the form. For example, if you cannot decide between serving size "B" and serving size "C" in a particular case you could label it as "B-C", indicating it is somewhere in between.

In preparing the handbook it has not been possible to provide illustrations of every kind of food that may be surveyed by all of the participants. Instead, a selection of 24 kinds of food was chosen that should provide examples of various forms and textures of foods. Some guidance is provided on each illustration of the kinds of foods that may be evaluated against the pictures on that page. In some cases it will be necessary to exercise ingenuity and good judgement in selecting the correct illustrations. It is important that you indicate which pictures were chosen. Note that even though an illustration shows a plate containing more than one kind of food, only the food at the front of the plate (nearest the camera) is to be used in judging helpings.

Some kinds of food need not be included in the serving size listing. For example, it isn't necessary to include any form of bread, pancakes and waffles. Also, don't include most forms of dessert, such as cake, pie, cookies, ice cream, pudding, etc. Do include fruit sauce when it is part of the meal. You may omit all spices and butter from the list. If there is some food that simply doesn't fit into any of the categories illustrated and which you are not sure how to handle, just list the food item and leave the serving size blank.

In judging serving sizes, indicate the amount on the person's plate before beginning to eat, regardless of who put the food on the plate or how much of it is actually eaten. If additional food is taken, also indicate the size of these helping in the last column. Indicate a serving size for each helping taken.

On the reverse side of the survey form is space to indicate liquid volume measurements. It is not necessary to maintain a record of liquids drunk during meals. Rather, you are asked to examine the cups and glasses used by members of your family and to report on their volumes. The volumes may be measured by means of an ordinary kitchen measuring cup. Pour measured quantities of water into the cup or glass being examined until the container is as full as it usually is for a meal. The volumes of each container used should be measured and reported, together with the number of times during the week it is used.

The table at the bottom of the back page of the survey form is to investigate your family's use of locally produced foodstuffs. In particular, the study will investigate how many families can or freeze fruits, vegetables, and meat. If your family never eats foodstuffs that you freeze or can yourself, your reply may be limited to answering the questions in the center of the page. By "canned fruit" do not include jam, jelly or preserves. Report only fruit canned and eaten as fruit sauce. The table at the bottom of the page is a listing of the home-canned and home-frozen foods consumed during the week survey, and the number of times each was eaten.

After completing the three parts of the survey form please sign it at the bottom of the second page to indicate that you have completed the study. Please return the completed forms and handbook to your teacher.

III. ILLUSTRATIONS OF  
FOOD SERVINGS

0027962

MEATS

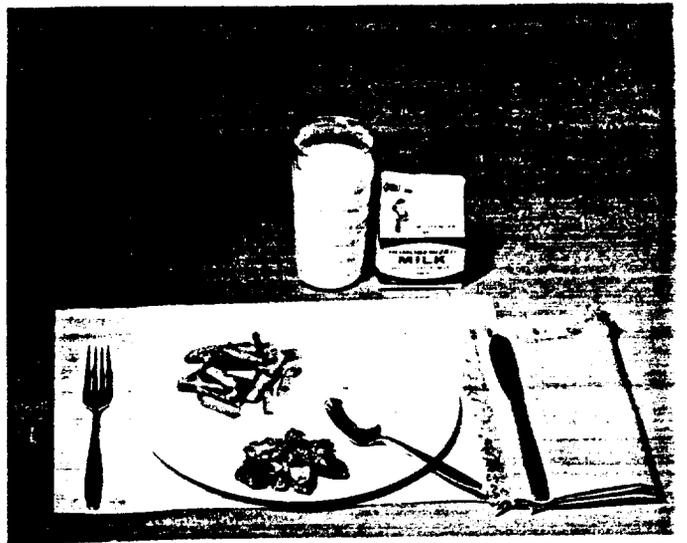
0027963

1. Beef Stew

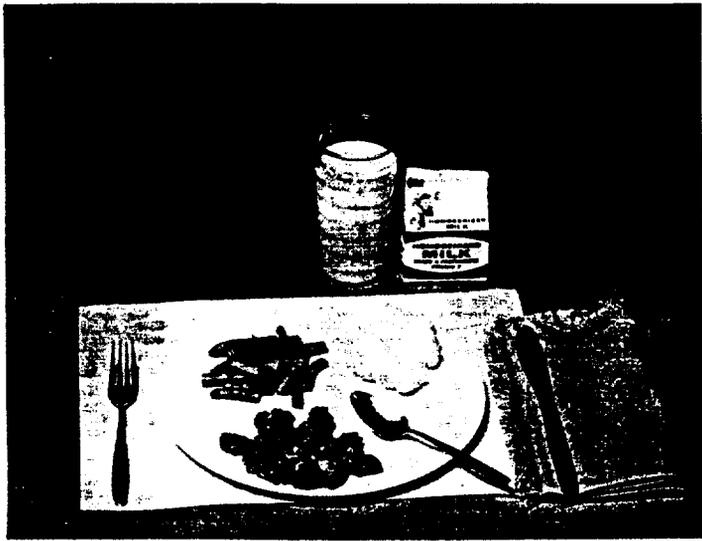
0027964



1-A



1-B



1-C



1-D



1-E

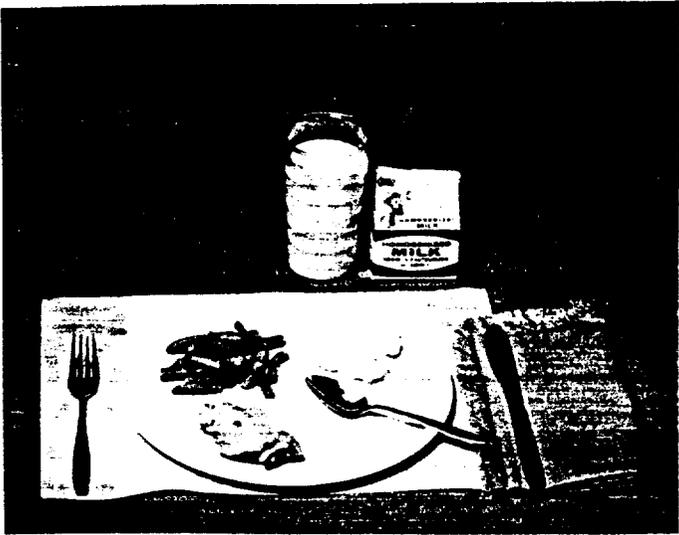
### BEEF STEW

Also use for: lamb stew, hash, other stewed boneless meat served in cubes.

0027965

2. Stewed Chicken

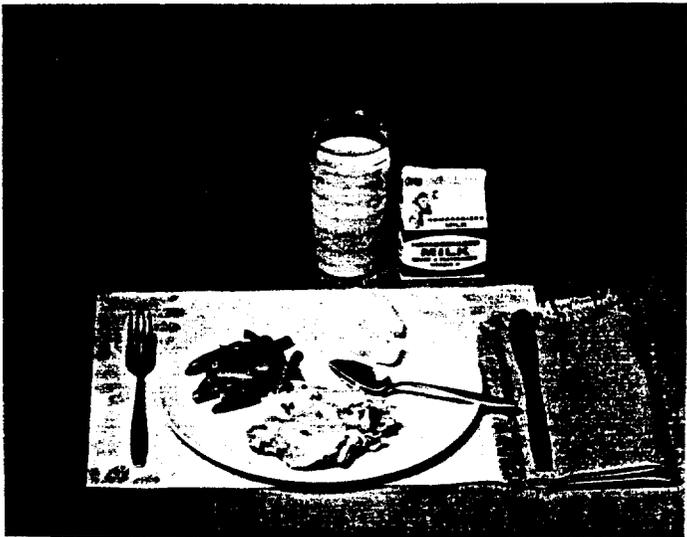
0027966



2-A



2-B



2-C



2-D



0027967

2-E

### STEWED CHICKEN

Also use for any stewed meat containing bone.

3. Fried Chicken

0027968



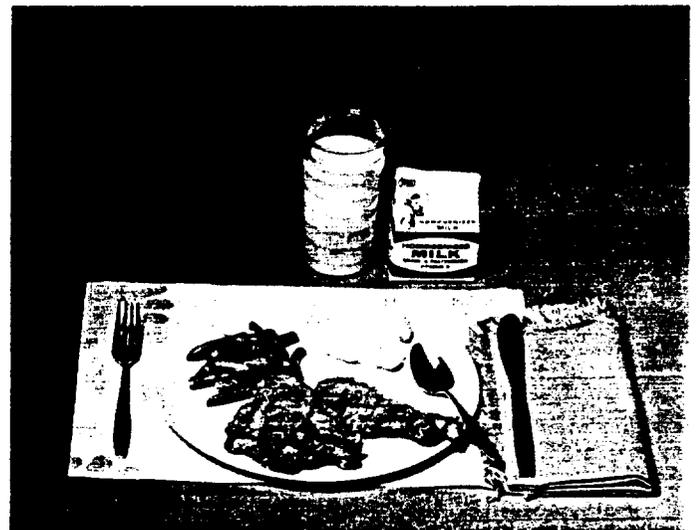
3-A



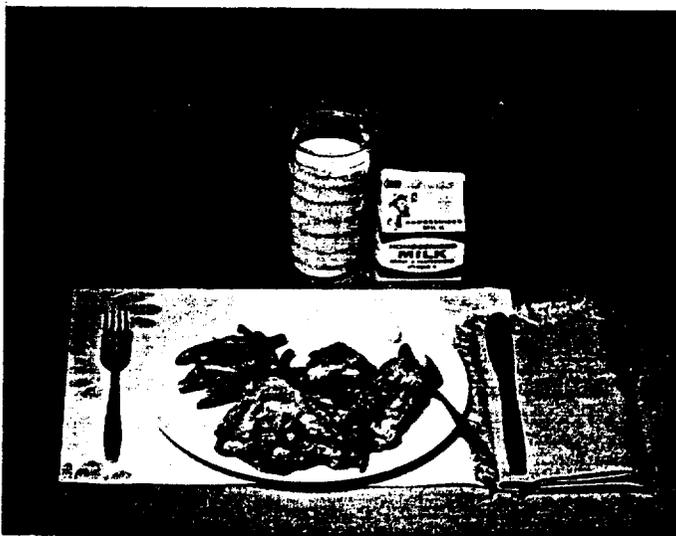
3-B



3-C



3-D



3-E

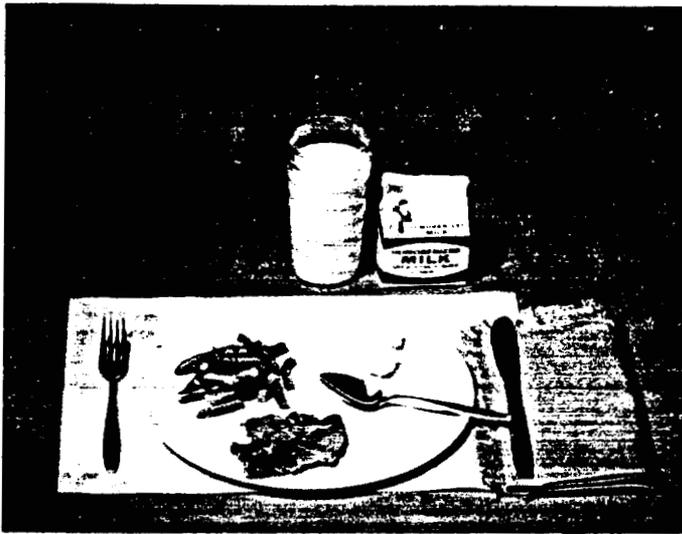
### FRIED CHICKEN

Also use for other fowl prepared by frying or jointed fowl prepared by baking. Also use for fried rabbit, game, etc.

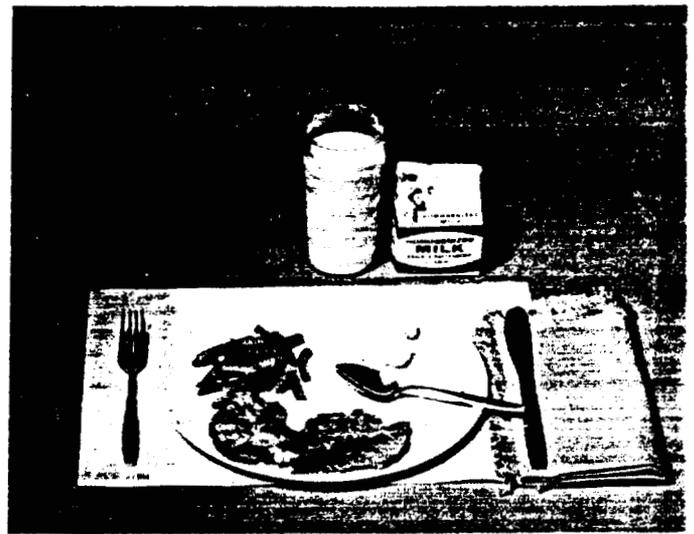
0027969

4. Sliced Roast Beef

0027970



4-A



4-B



4-C



4-D



4-E

### SLICED ROAST BEEF

Also use for other sliced roast meat such as pork, turkey, mutton, and for sliced baked ham.

5. Broiled Steaks and  
Chops w/bone

0021972



5-A



5-B



5-C



5-D



5-E

### **BROILED STEAKS AND CHOPS WITH BONE**

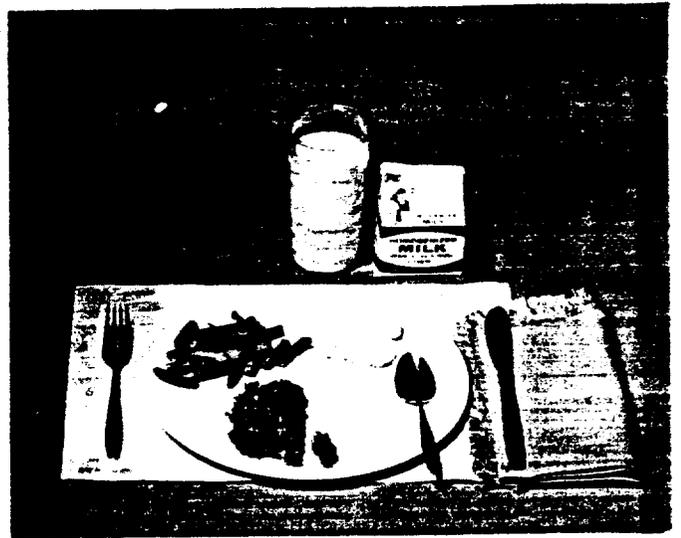
Also use for any other broiled meat containing bone such as pork, lamb, game, etc.

0027974

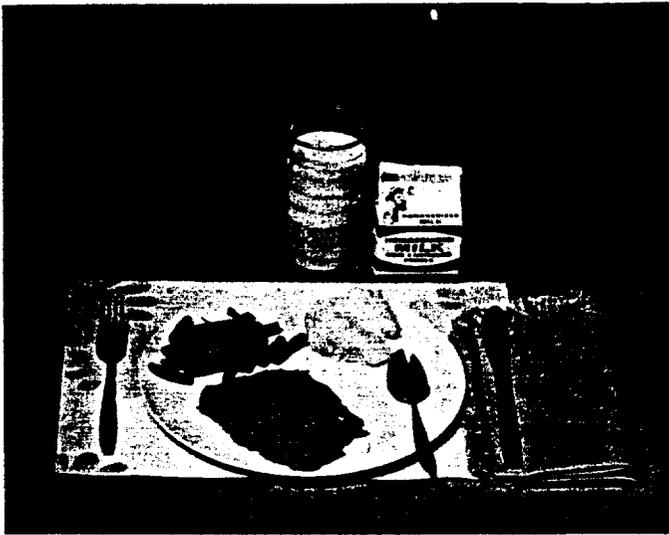
U. S. Bureau Business Steek



6-A



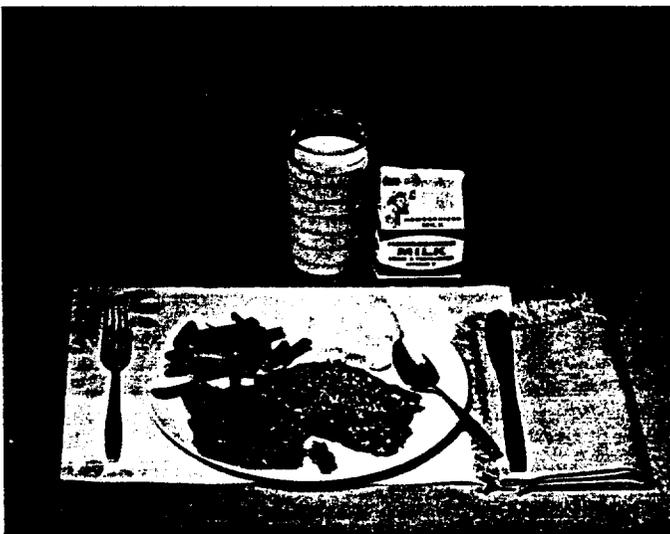
6-B



6-C



6-D



6-E

### **BROILED BONELESS STEAK**

Also use for any other broiled boneless meat such as pork, ham, game, etc.

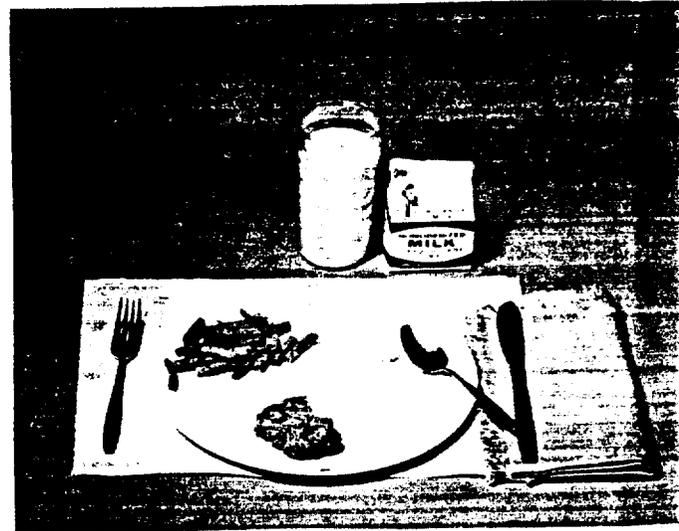
0027975

7. Broiled Hamburger Patties

0027976



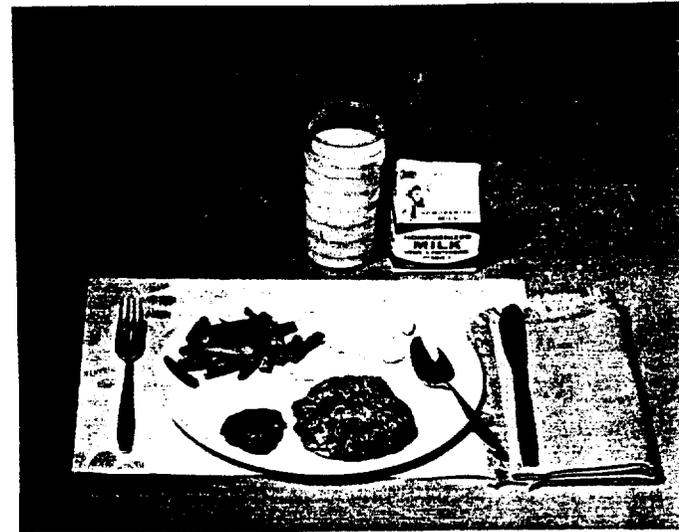
7-A



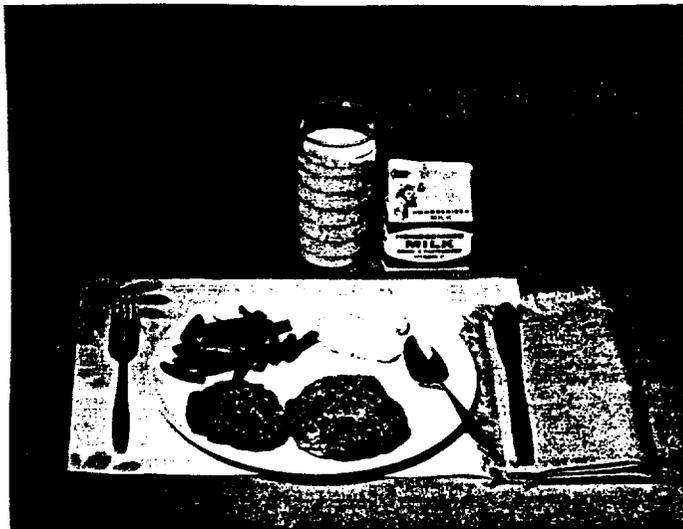
7-E



7-C



7-D



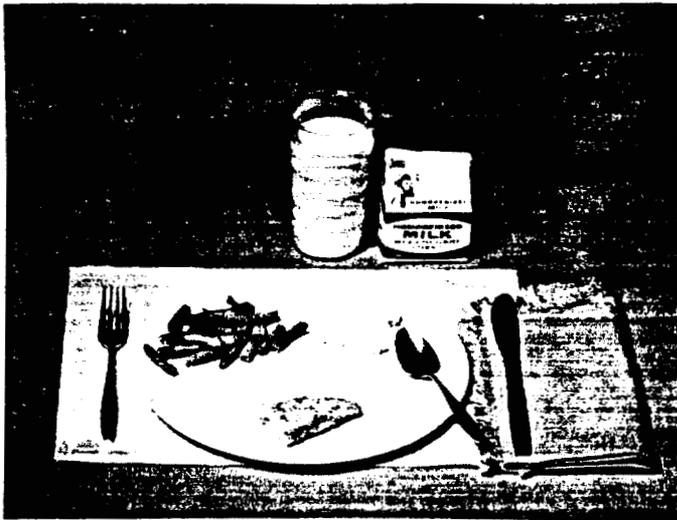
7-E

### HAMBURGER PATTIES

Also use for any other ground meat prepared in patties, such as pork sausage, hash, croquettes, etc.

8. Fried Fish Fillers

0027978



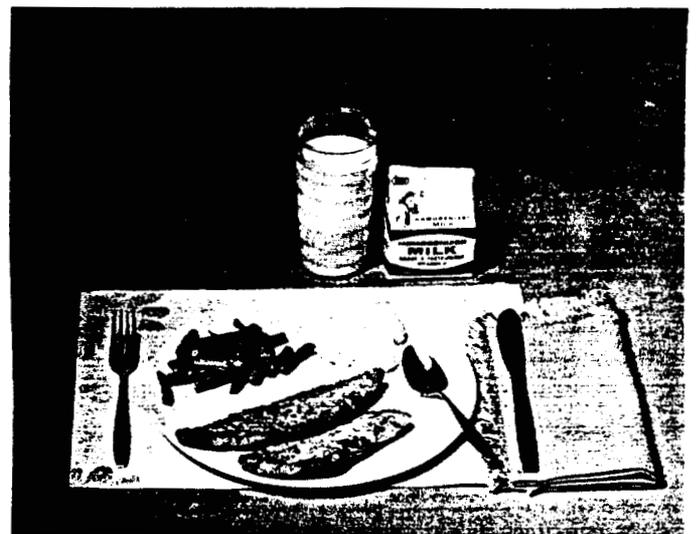
8-A



8-B



8-C



8-D



8-E

### FRIED FISH FILLETS

Also use for all varieties of fish fried or broiled as fillets or whole fish.

9. Broiled Fish Steaks

0027980



9-A



9-B



9-C



9-D



9-E

### BROILED FISH STEAKS

Also use for all broiled, fried or baked fish cut as steaks from some variety of large fish such as salmon, steelhead, sturgeon, etc.

10. Meat Loaf

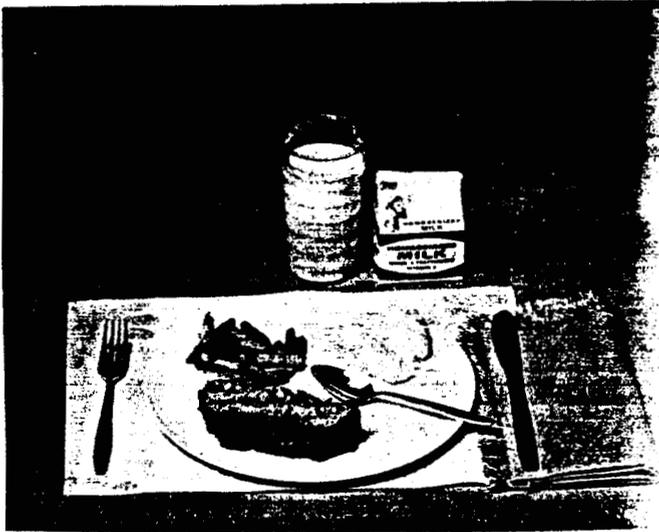
0027982



10-A



10-B



10-C



10-D



10-E

### MEAT LOAF

Also use for all kinds of ground meat prepared in the form of a baked loaf such as salmon or ham loaf.

0027983

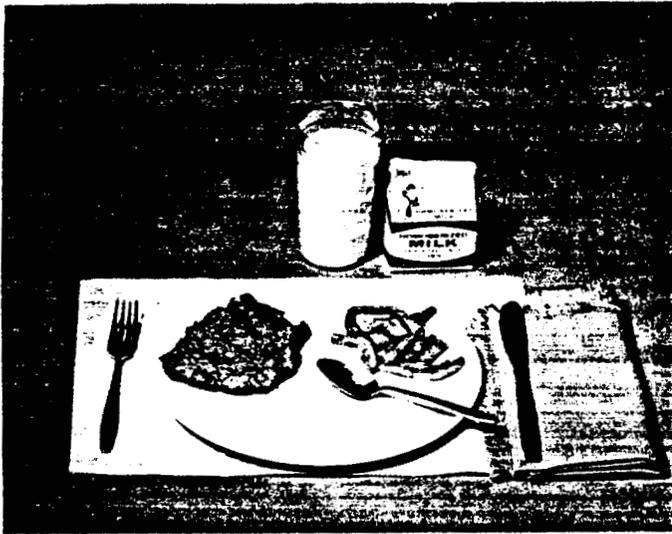
VEGETABLES

0027984

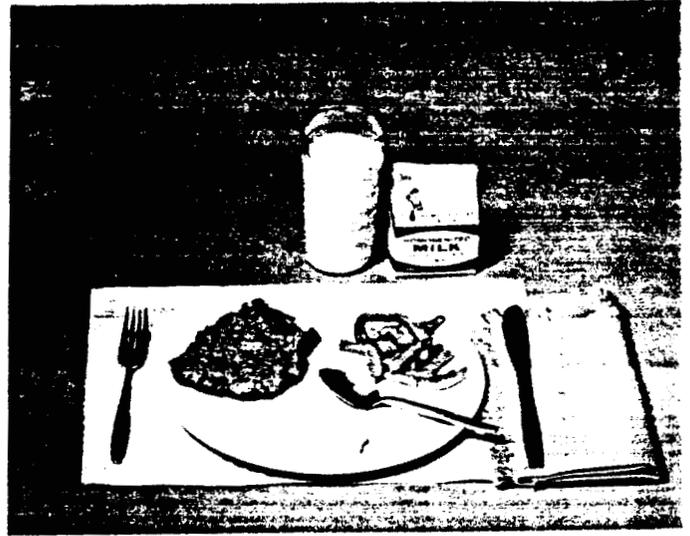
11. Mashed Potatoes

VEGETABLES

0027985



11-A



11-B



11-C



11-D



11-E

### MASHED POTATOES

Also use for other mashed or starchy foods of this same consistency such as rice, spaghetti and macaroni, noodles, dressing, mashed sweet potatoes or squash, etc.

12. Baked Potatoes

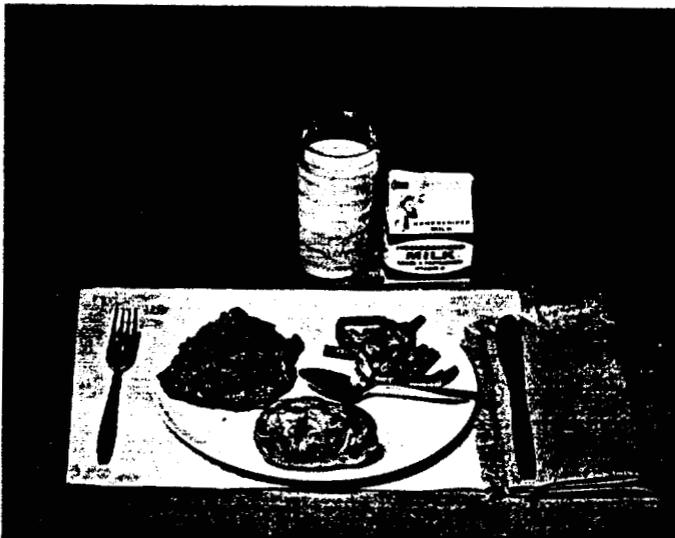
0027987



12-A



12-B



12-C



12-D



12-E

### BAKED POTATOES

Also use for other vegetables of this general shape that are cooked whole such as acorn squash, baked sweet potatoes, etc.

13. French Fried Potatoes

0027989



13-A



13-B



13-C



13-D



13-E

### FRENCH FRIED POTATOES

Also use for other kinds of fried potatoes such as hash browned potatoes, cottage fried potatoes, etc.

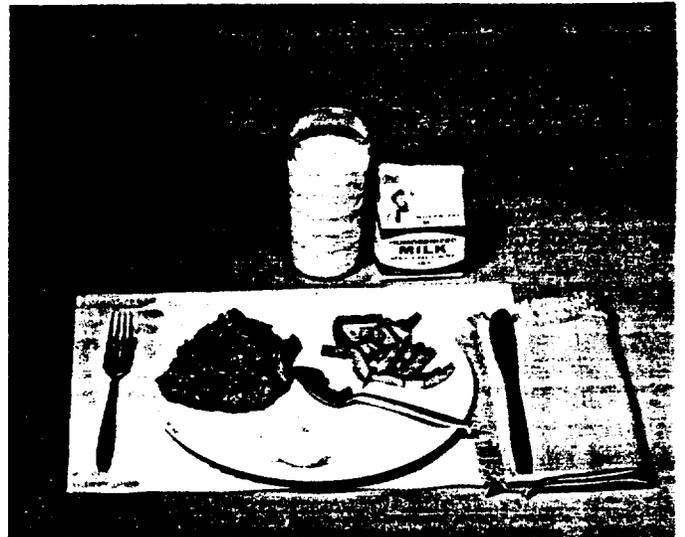
0027990

14. Boiled Potatoes

0027991



14-A



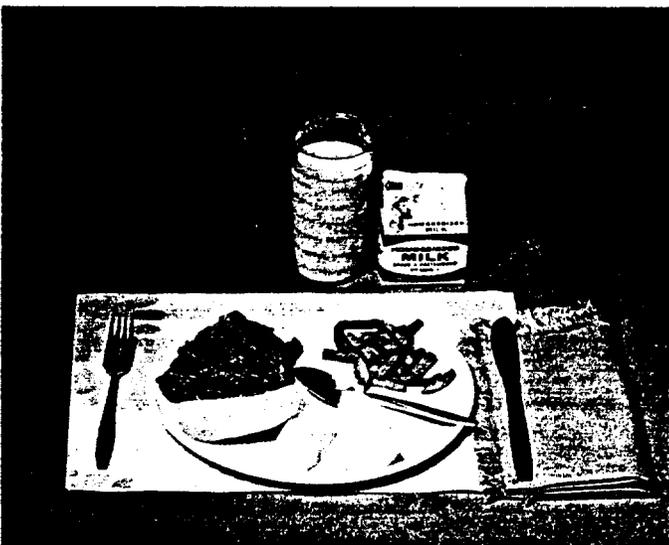
14-B



14-C



14-D



14-E

### BOILED POTATOES

Also use for other boiled vegetables cooked in large pieces such as sweet potatoes, whole carrots, etc.

15. Green Beans

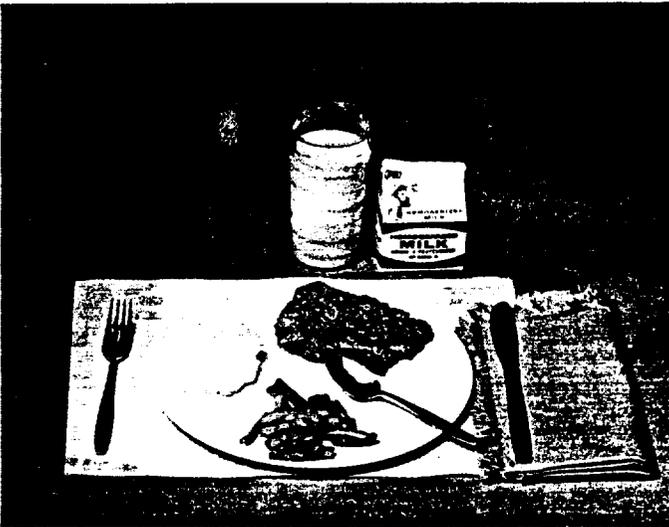
0027993



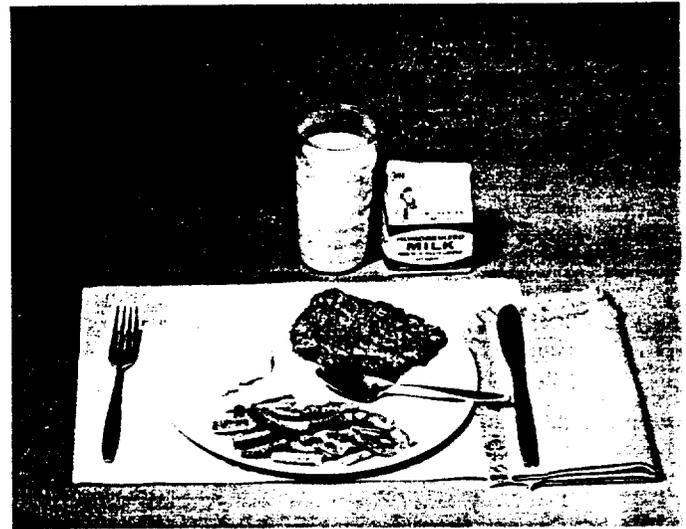
15-A



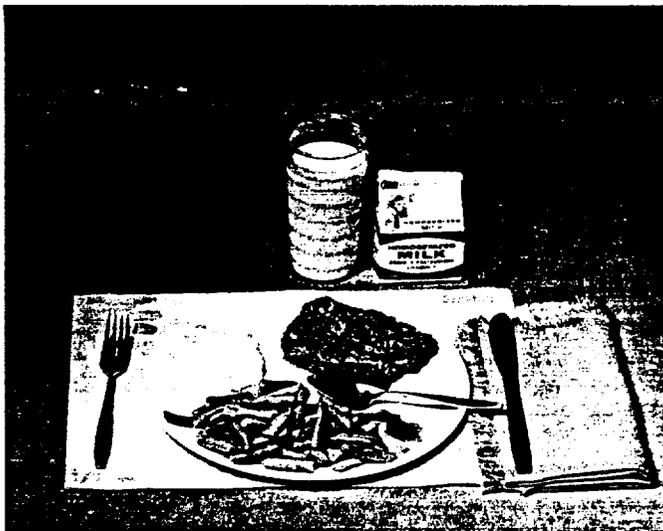
15-B



15-C



15-D



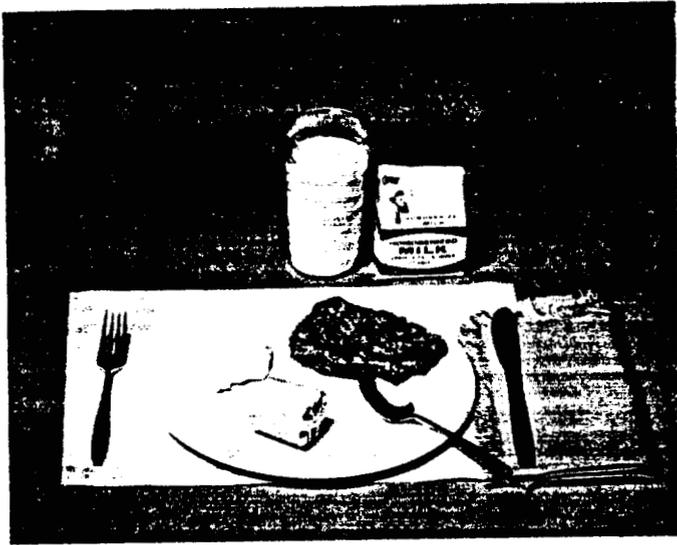
15-E

### GREEN BEANS

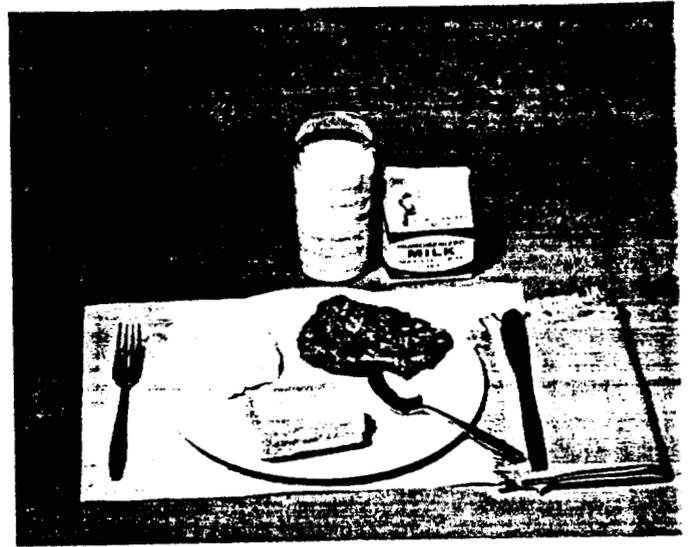
Also use for other cooked small vegetables or diced vegetables such as peas, sliced carrots, mixed vegetables, corn (except corn on the cob), lima beans, diced beets, etc.

16. Corn on the Cob

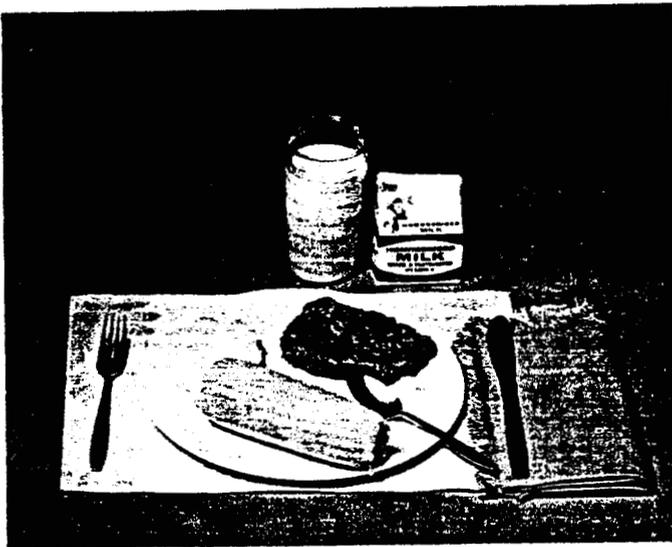
0027995



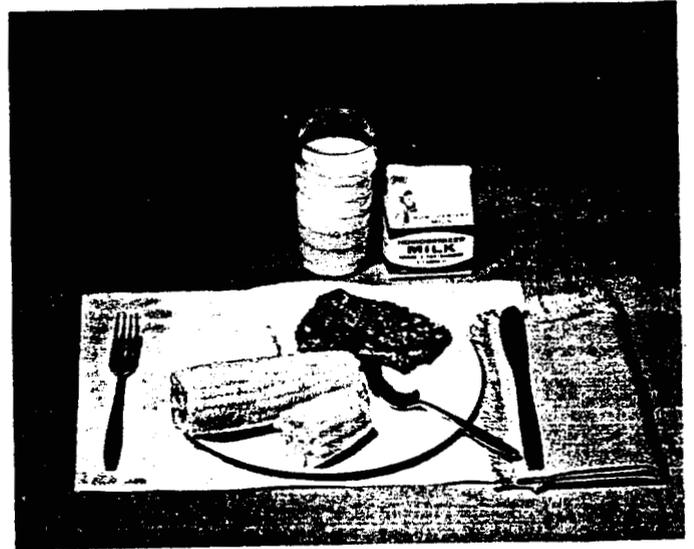
16-A



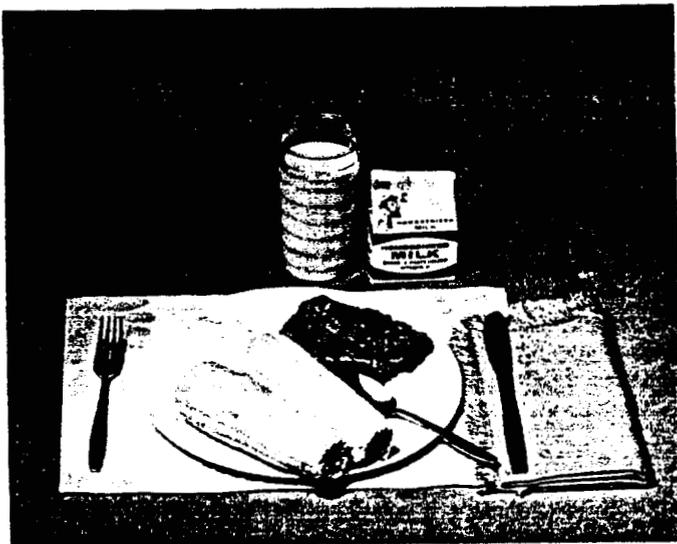
16-B



16-C



16-D



16-E

CORN ON THE COB

002799b

17. Whole Beets

0027997



17-A



17-B



17-C



17-D



17-E

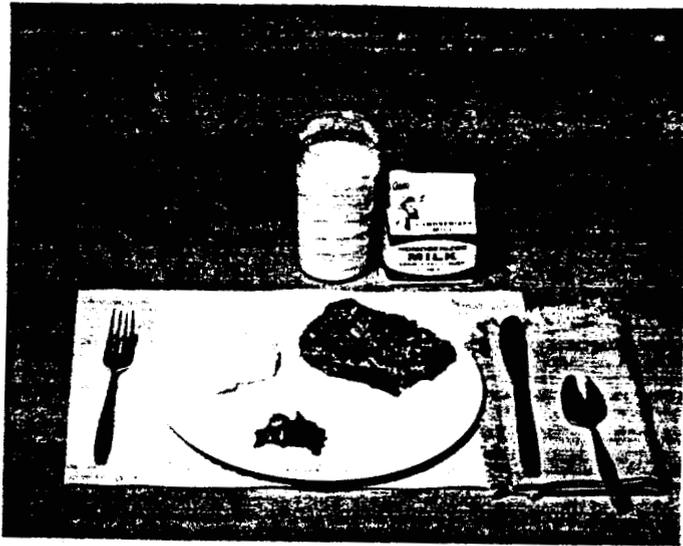
0027998

### WHOLE BEETS

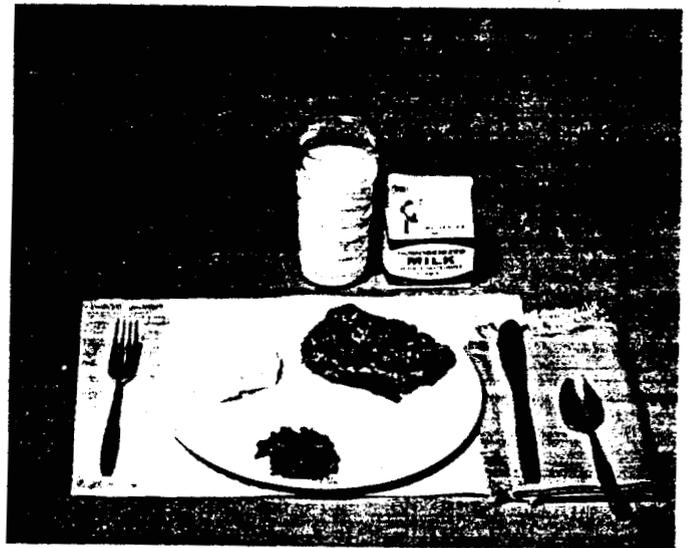
Also use for other cooked, whole vegetables such as rutabagas, turnips, brussel sprouts, whole cucumber pickles, etc.

18. Spinach

0027999



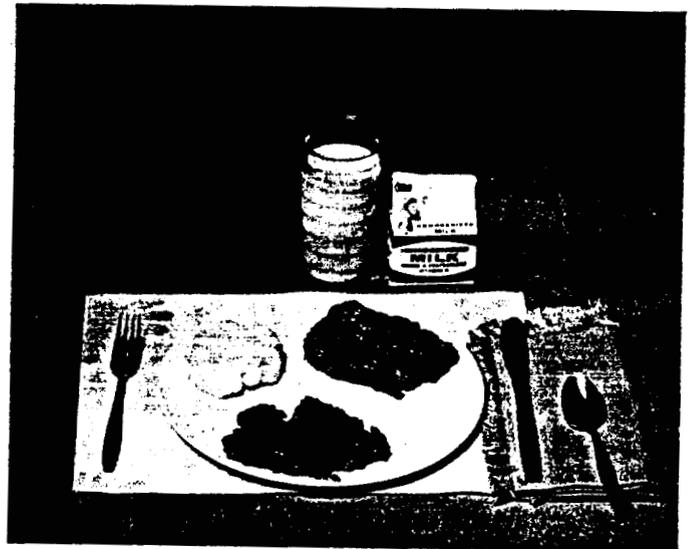
18-A



18-B



18-C



18-D



18-E

### SPINACH

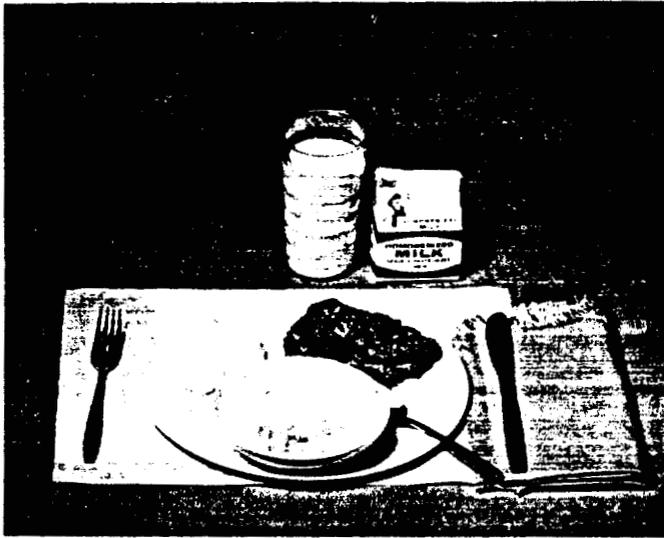
Also use for other kinds of boiled greens, boiled cabbage, boiled onions, etc.

SALADS

0028001

19. Chopped Lettuce Salad

0028002



19-A



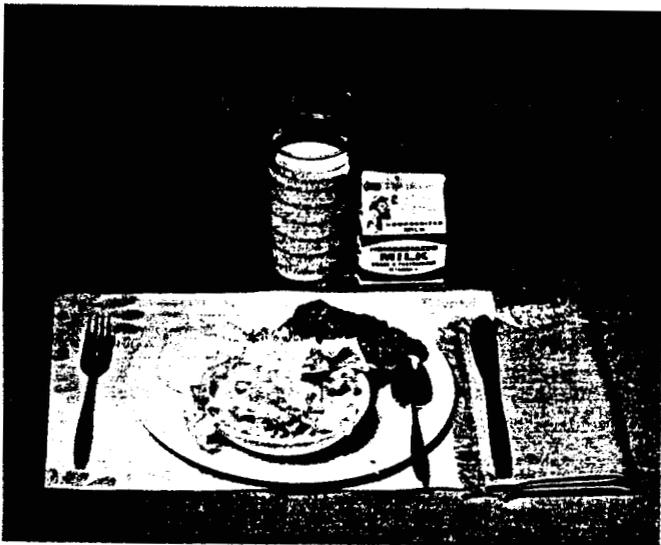
19-B



19-C



19-D



19-E

### CHOPPED LETTUCE SALAD

Also use for various kinds of tossed green salads including those containing other fresh vegetables such as radishes, cucumbers, onions, peppers, etc.

20. Sliced Tomatoes

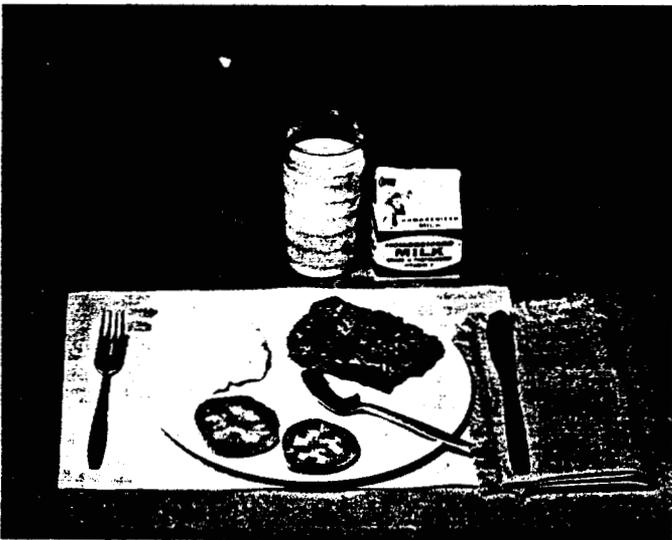
0028004



20-A



20-B



20-C



20-D



20-E

### SLICED TOMATOES

Also use for other sliced fresh vegetables such as onions, cucumbers (also pickle slices), sliced fruit, etc.

21. Gelatin Salad

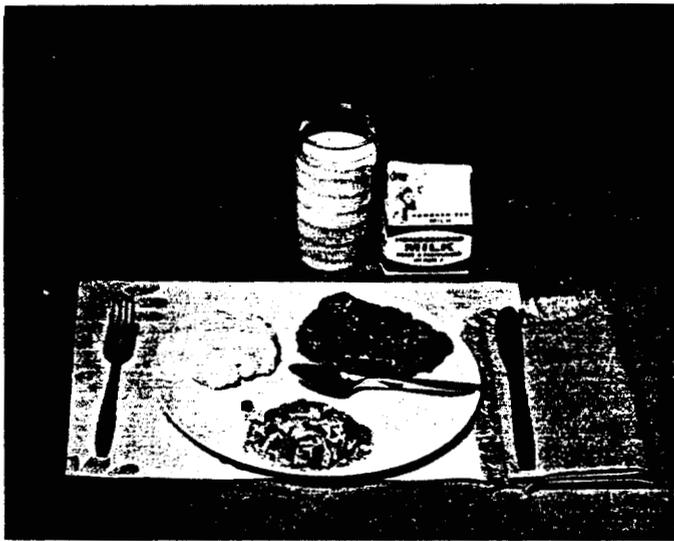
002800b



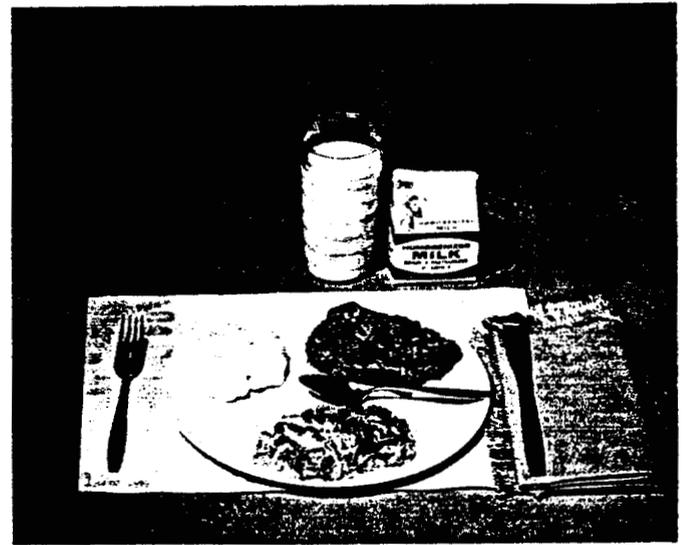
21-A



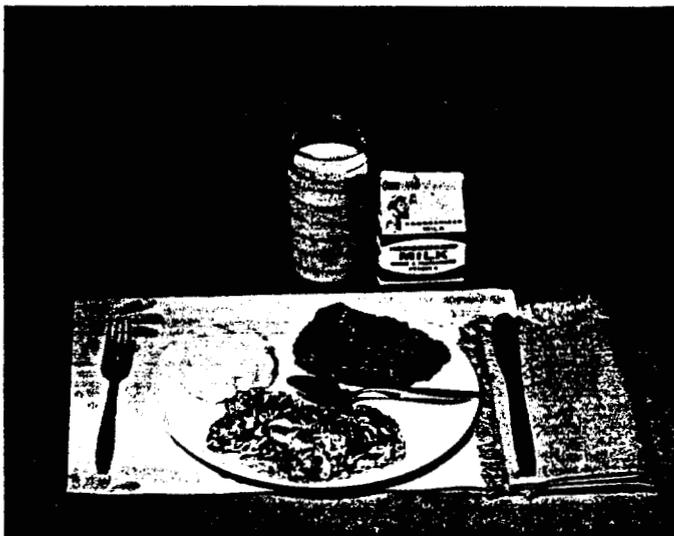
21-B



21-C



21-D



21-E

### GELATIN SALAD

Also use for various forms of fruit and vegetable salad prepared with gelatin.

0028007

22. Cabbage Slaw

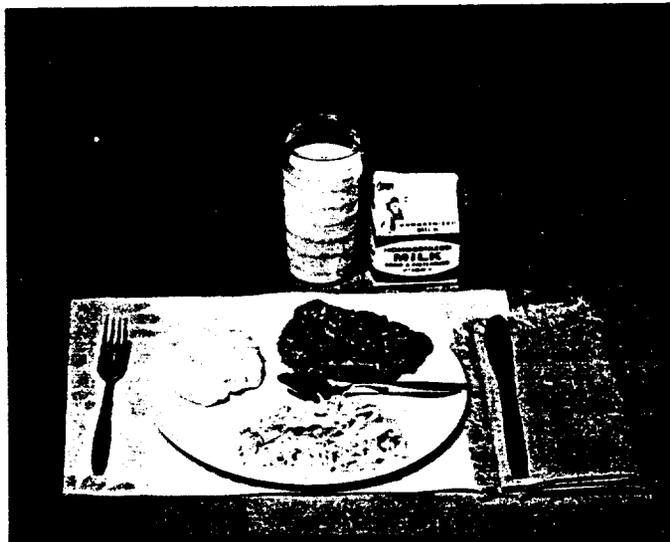
0028008



22-A



22-B



22-C



22-D



22-E

### CABBAGE SLAW

Also use for other shredded vegetable salads, such as shredded carrots, beets, etc.

FRUIT SAUCE

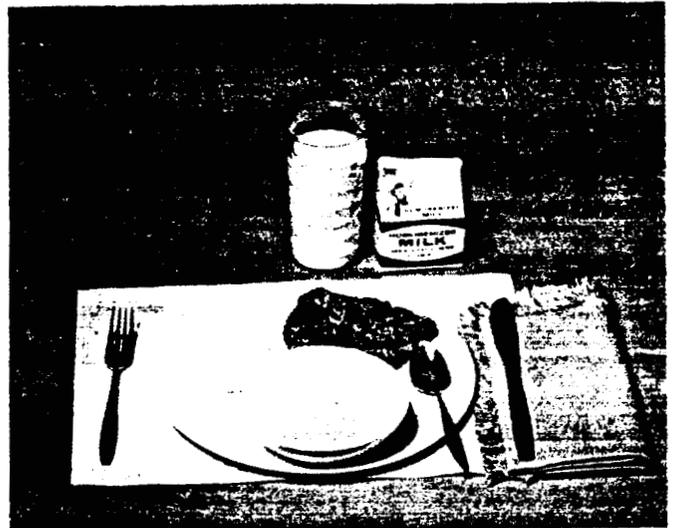
0028010

23. Applesauce

0028011



23-A



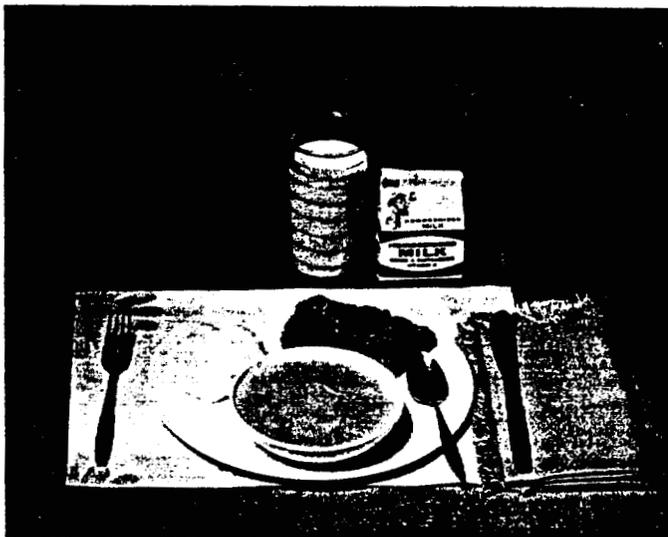
23-B



23-C



23-D



23-E

### APPLESAUCE

Also use for any fruit sauce such as sliced peaches, pears, berries, pineapple, etc. The illustration may also be used to judge serving sizes of cooked cereal such as oatmeal.

CEREAL

0028013

24. Corn Flakes

0028014



24-A



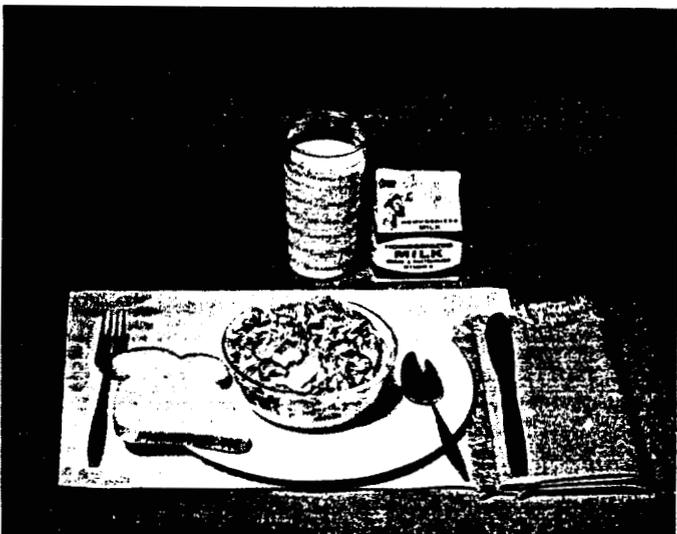
24-B



24-C



24-D



24-E

### CORN FLAKES

Also use for any other dry cereal such as Bran Flakes, Shredded Wheat, etc.

0028015

IV. WEIGHTS OF  
SERVINGS

0028016

IV. Weights of the servings illustrated in this handbook

WEIGHT OF SERVING IN GRAMS

Type of Food	Serving Size				
	A	B	C	D	E
1. Beef Stew	22	47	98	147	224
2. Stewed Chicken	25	54	107	154	218
3. Fried Chicken	29	62	98	160	227
4. Sliced Roast Beef	25	49	100	158	235
5. Broiled Steaks and Chops w/bone	35	73	122	175	256
6. Broiled Boneless Steak	24	49	94	134	183
7. Broiled Hamburger Patties	18	39	83	143	190
8. Fried Fish Fillets	23	45	82	146	227
9. Broiled Fish Steaks	27	63	104	167	234
10. Meatloaf	24	49	118	173	223
11. Mashed Potatoes	25	50	101	150	225
12. Baked Potatoes	30	53	126	179	247
13. French Fried Potatoes	15	30	60	90	150
14. Boiled Potatoes	17	31	49	93	156
15. Green Beans	10	25	50	75	135
16. Corn on the Cob	73	147	270	362	490
17. Whole Beets	20	30	89	115	178
18. Spinach	10	20	40	70	100
19. Chopped Lettuce Salad	5	10	25	50	100
20. Sliced Tomatoes	18	38	56	87	143
21. Gelatin Salad	23	49	100	150	210
22. Cabbage Slaw	10	20	40	60	80
23. Applesauce	25	47	100	150	225
24. Corn Flakes	10	20	30	40	50

The weights are for foods as illustrated, including any bone, fat, sauce or other material shown along with the food in question. The meat illustrations are shown with 101 g mashed potatoes, 50 g green beans, and 283 g milk. Potato illustrations also contain 94 g boneless steak, 50 g green beans, and 283 g milk. Vegetable illustrations also contain 101 g mashed potatoes, 94 g boneless steak and 283 g milk.

V. NOTES - FORMS

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FOOD CONSUMPTION STUDIES - SERVING SIZE EVALUATION

STUDENT: \_\_\_\_\_

Name

Address

Phone

CLASS HOUR: \_\_\_\_\_ TEACHER: \_\_\_\_\_

PERSON STUDIED: M  F  Height \_\_\_\_\_ in. Weight \_\_\_\_\_ lbs.

AGE: Over 60  30-60  20-30  Under 20 \_\_\_\_\_ years

SERVING SIZES

	Kind of Food	Picture Number	Size of First Serving	Size of Additional Servings		Kind of Food	Picture Number	Size of First Serving	Size of Additional Servings
MONDAY EVENING					SATURDAY NOON				
TUESDAY EVENING					SATURDAY EVENING				
WEDNESDAY EVENING					SUNDAY BREAKFAST				
THURSDAY EVENING					SUNDAY NOON				
FRIDAY EVENING					SUNDAY EVENING				
SATURDAY BREAKFAST									

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