1944

Canning Fruits and Vegetables: Extension Circular 9-31-2 1944

Jessie Greene

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EXTENSION CIRCULAR
9-31-2

PREPARED FOR FIRST YEAR 4-H PRESERVATION CLUBS

EXTENSION SERVICE
UNIVERSITY OF NEBRASKA COLLEGE OF AGRICULTURE
AND U. S. DEPARTMENT OF AGRICULTURE
COOPERATING
W. V. LAMBERT, DIRECTOR
JESSIE G. GREENE

The first year of the Food Preservation project aims to teach 4-H Club girls how to can fruits and vegetables. It is not only fun to can but there is a satisfaction in knowing that you are saving foods which will help to keep the family fit. Start canning as soon as there is something to can. You will see by the following list that canning directions are found in Problem II.

Contents

<table>
<thead>
<tr>
<th>Problem</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>3</td>
</tr>
<tr>
<td>II</td>
<td>10</td>
</tr>
<tr>
<td>III</td>
<td>24</td>
</tr>
<tr>
<td>IV</td>
<td>28</td>
</tr>
<tr>
<td>V</td>
<td>30</td>
</tr>
</tbody>
</table>

Requirements

Can at least 35 jars, 3 varieties of fruits and 3 varieties of vegetables.
Score food habits.
Figure family canning and storage budget.
Keep a record of condition of canned products when opened.

Problem I. Eat This Way Every Day

A daily guide for meal planning.
The food clock gives a standard for planning daily meals that meets the requirement for good nutrition. This 4 3 2 2 2 2 standard is based on the food selection score card and the “Basic 7.” 4-H folks call it their key to good nutrition. They not only score and try to improve their food habits but help to plan the home meals so each member of the family may be well nourished. In order to be sure of getting the vitamins and minerals needed each day, growing boys and girls should try to meet the 4 3 2 2 2 2 standard explained as follows:

4 Servings or cups milk.
3 servings vegetables including one that is leafy, yellow or green.
2 servings fruit including a citrus fruit or tomato.
2 servings whole grain cereal or bread.
2 servings protein food such as cheese, eggs, meat, dried beans or peas.
2 servings or tablespoons butter.

The food selection score card gives the daily requirement of the most essential foods. It is not intended to represent a complete diet. Moderate amounts of fats, sweets, and other desirable foods should be added to the foods listed. The size of the serving should vary according to the need of the person. An average adult serving of vegetables, fruits or cereals is one-half cup. The standard for adults is the same as above with the exception of milk. Adults need at least 2 servings or cups of milk daily.

**Directions for Using the Food Selection Score Card**

Score yourself each day for a week at the beginning of the project and again near the close of the project. If you did not use as much as the lowest number on the score card give yourself a zero. Do not divide the numbers. For example 2 cups of milk is 10 points, less than 2 cups is zero. If your average score shows that your food habits are above 90, try to keep them so. If your average is below 90, raise it by improving your food habits where they need it. It will be interesting to compare the average for each week.

**Milk.** One serving is one cup. Include milk cooked in food, served with foods, or taken as a beverage.

**Vegetables and Fruits.** One serving is 1/2 cup. Citrus fruits, oranges, grapefruit, lemons, and tomatoes are the best sources of vitamin C. Citrus fruit contains about twice as much vitamin C as tomatoes. Tomatoes may be either cooked or raw because short cooking of a food that is as acid as tomatoes has little effect on vitamin C. Tomatoes may be counted either as vegetables or fruits. Any raw fruit or vegetable will furnish some Vitamin C.

**Whole Grain Products.** One serving is 1/2 cup cereal or 2 slices of bread. Include cereals, breads and any other foods made from whole grain such as wheat, oats, rye, corn, grain sorghums, etc.

**Meat.** Includes fish, game and poultry, but does not include bacon or salt pork, which are classified as fats.

**Butter.** One serving is 1 tablespoon. Includes butter used for seasoning as well as with bread.
Deductions. Deduct for sweets if they are eaten between meals, but make no deduction if they are eaten at the end of a meal. Sweets include all confections, cakes, cookies and food made with a considerable amount of sugar or syrup. One reason deductions are made for tea and coffee is that they usually take the place of milk. The reason deductions are made for sweets between meals is that they usually take the place of some more essential food.

**Planning Meals by the Standard**

When meals are planned by the 4 3 2 2 2 2 standard it is easy to have a high score. The general menus below will serve as a guide for planning home meals. They may be varied in many ways. For example, in this plan you have milk to drink each meal, or 3 cups. Milk with the cereal and in the dessert makes the fourth cup for the day. If you have only two cups to drink you may get one cup as milk toast and one as milk soup. Various amounts may be obtained from milk gravy, or creamed and escalloped dishes.

The following general menus show how to meet the daily 4 3 2 2 2 2 standard with simple meals.

<table>
<thead>
<tr>
<th>Servings</th>
<th>Milk</th>
<th>Vegetables</th>
<th>Fruit</th>
<th>Protein</th>
<th>Whole Grain</th>
<th>Butter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td>* Fruit</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole Grain Cereal, Milk</td>
<td>1/2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dinner</td>
<td>** Protein</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes, ‡ Other Vegetable</td>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole Grain Bread, Butter</td>
<td></td>
<td>1/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk Dessert</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supper</td>
<td>** Protein</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>♠ Vegetable, Bread, Butter</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit Sauce</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Servings</td>
<td>4 3 2 2 2 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Citrus fruit or tomato served as a fruit.

** Protein includes meats, cheese, eggs, poultry, fish, dried beans, or dried peas.

‡ At least one serving of a leafy, yellow or green vegetable.

In the following space write breakfast, dinner, and supper menus, giving definite foods such as oranges for fruit, cracked wheat for whole grain cereal,
roast pork for protein, etc. Any foods desired may be added to the general menu. Fill in the number of servings in the menu and total each column. Does the menu meet the daily standard?

In order to meet the 4 3 2 2 2 2 standard throughout the year, you need to produce as much of the family food as possible and save the surplus products by canning, storing, drying, curing, or freezing. Although freezing is becoming more popular, canning and storing are the most common methods for conserving fruits and vegetables. The family canning and storage budget for the non-growing season has been worked out for one adult. The "Basis for Figuring Family Budget" explains how to alter the adult budget to suit children of different ages. Use this in figuring your family budget and place amounts in the "Canned" and "Stored" columns under "My Family." It will serve as a guide for your home canning and storing.

### Basis for Figuring Family Budget

- **Boy, 14 to 17 years**: ⅓ more than adult budget
- **Girl, 13 to 17 years**: Same as adult budget
- **Child 8 to 12 years**: ⅔ of adult budget
- **Child, 5 to 7 years**: ⅔ of adult budget
- **Child under 4 years** (minus corn, onions, cabbage): ⅔ of adult budget

### Number and Size of Servings

- 1 pound root vegetables, greens or cabbage: 3 servings
- 1 quart canned vegetables and fruits: 8 servings
- ½ cup of canned or cooked fruits and vegetables: 1 serving

### Amounts

Included in the budget is about 10 per cent for emergencies, company, breakage, and spoilage.

Relishes and pickles help to make the diet more palatable, so if possible, preserve these as extra vegetables or fruits.

Quantities are based on a moderate cost diet which allows one serving daily of potatoes, one serving daily of fresh or stored vegetables, one serving daily of canned vegetables, one serving daily of citrus fruit, other fresh fruit or canned tomatoes, and one serving daily of canned fruit.

Tomatoes may be used as a vegetable but the amount given was figured on the basis of one-half the following requirement of "One serving of tomatoes or citrus fruit."

If desired, the amounts of stored vegetables may be increased thus making it possible to decrease the amount of canned vegetables. Dried and additional stored fruit may be used to decrease the amount of canned fruit.

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### CANNING FRUITS AND VEGETABLES

#### FAMILY CANNING AND STORAGE BUDGET *

**FOR 36 NON-GROWING WEEKS**

<table>
<thead>
<tr>
<th></th>
<th>Average for one adult</th>
<th>My Family</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vegetables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td>6 qt.</td>
<td>7 lb. dry</td>
</tr>
<tr>
<td>Beets</td>
<td>4 qt.</td>
<td>6 lb.</td>
</tr>
<tr>
<td>Cabbage</td>
<td>4 qt. kraut</td>
<td>20 lb.</td>
</tr>
<tr>
<td>Carrots</td>
<td>4 qt.</td>
<td>12 lb.</td>
</tr>
<tr>
<td>Corn</td>
<td>5 qt.</td>
<td>1 lb. dried</td>
</tr>
<tr>
<td>Greens</td>
<td>7 qt.</td>
<td></td>
</tr>
<tr>
<td>Onions</td>
<td></td>
<td>10 lb.</td>
</tr>
<tr>
<td>Parsnips &amp; Turnips</td>
<td></td>
<td>14 lb.</td>
</tr>
<tr>
<td>Peas</td>
<td>6 qt.</td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td>120 lb.</td>
<td></td>
</tr>
<tr>
<td>Pumpkin</td>
<td>5 lb.</td>
<td></td>
</tr>
<tr>
<td>Squash</td>
<td>5 lb.</td>
<td></td>
</tr>
<tr>
<td>Tomatoes</td>
<td>See Fruits</td>
<td></td>
</tr>
<tr>
<td><strong>Fruits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apples</td>
<td>10 qt.</td>
<td>1 bu.</td>
</tr>
<tr>
<td>Berries</td>
<td>7 qt.</td>
<td></td>
</tr>
<tr>
<td>Cherries</td>
<td>4 qt.</td>
<td></td>
</tr>
<tr>
<td>Peaches</td>
<td>6 qt.</td>
<td></td>
</tr>
<tr>
<td>Pears</td>
<td>3 qt.</td>
<td></td>
</tr>
<tr>
<td>Plums</td>
<td>4 qt.</td>
<td></td>
</tr>
<tr>
<td>Rhubarb</td>
<td>2 qt.</td>
<td></td>
</tr>
<tr>
<td>Tomatoes</td>
<td>18 qt.</td>
<td></td>
</tr>
</tbody>
</table>

* In emergency times it would be well to increase the amounts given on the canning budget. See basis for figuring family budget.
Problem II. Canning Directions

If you have had canning in connection with Learning to Cook or Hows and Whys for Young Cooks, you will be better prepared for this canning project. With a previous knowledge of methods, you should have a higher quality of canned products. One aim is to help preserve the family food supply so quantity is also important.

Reasons for Canning

Health—Fruits and vegetables contain minerals and vitamins which are necessary to health. In order to have enough for the winter season, one must rely on stored and canned orchard and garden products.

Economy—it reduces living expense to preserve foods when they are abundant and inexpensive for a time when they are scarce and high in price. Grow as much of the home food supply as possible.

Variety—A greater variety means more interesting and more palatable meals.

Patriotism—Not only our country but the whole world needs food.

Canning Success

Successful canning is based on a knowledge of the causes of spoilage and also on a knowledge of preventing it.

Spoilage is caused by enzymes and also by micro-organisms including bacteria, yeasts, and molds. All fresh fruits and vegetables contain enzymes which cause ripening and unless their action is checked the ripening goes too far and causes decay. The low temperatures of cold storage retard the action of enzymes and the heat of cooking or canning destroys them. To prevent changes due to enzymes, vegetables should be canned as soon as possible after they are gathered. “Two hours or less from garden to can” is a good rule. If products must be held, they should be kept in small lots in a cool, well-ventilated place. Bacteria, yeasts, and molds are so tiny they can be seen only with a microscope. They are found everywhere in air, water, and soil. Yeasts and molds are easily destroyed by temperatures slightly below the boiling point of water. While bacteria are growing they may be destroyed by boiling temperature but some kinds change into a spore or seed form, which is difficult to kill by boiling. However, if kept at 240°, which is the temperature in a steam pressure canner at 10 lbs. pressure, they may be destroyed in 30 minutes. When foods are acid, as for example fruits and tomatoes, all forms of bacteria are killed within a reasonable time by boiling. With the non-acid foods, such as meat and partially all vegetables except tomatoes, the spore forms of bacteria are killed only at higher temperatures.

If all micro-organisms in food are killed and it is sealed steaming hot in sterile, air-tight containers, the food is said to be sterilized. The application of heat to foods during canning in order to kill micro-organisms is called processing. For successful canning, it is not enough just to destroy these organisms, the food must be protected from air by sealing so that no micro-organisms can enter.

Spillage

Bacteria may cause the following types of spoilage in canned foods: fermentation, flat-sour, putrefaction and botulinus spoilage.

During fermentation, acid and gas are produced causing the food to become sour or “cheesy.” Tin cans may bulge or seal or jars may be broken by the gas. Acids formed by fermentation preserve sauerkraut and dill pickles.

Flat-sour spoilage is caused by bacteria that produce acid without gas. They grow best at temperatures about 130° to 140° F. and sometimes cause spoilage in canned foods not properly cooled after processing or held at too high storage temperatures. Corn, peas, asparagus, and snap beans are subject to flat-sour spoilage.

Putrefaction caused by putrefactive bacteria is marked by gas production, a bad odor, and the softening and darkening of canned food. Putrefaction usually occurs in foods low in acidity and high in protein, such as meats, peas, and corn.

Botulinous spoilage. See page 16.

Equipment for Canning

Mother may want you to collect the equipment for canning, so this list should help you:

- Jars, lids, rubber caps.
- Kettle for cooking fruit (do not use tin or chipped enamel).
- Jar lifter.
- Jar lifter for placing and removing jars from steam or boiling water bath.
- Wooden spoon.
- Pans, paring knife, long-handled fork, measuring cup.
**CANNING FRUITS AND VEGETABLES**

**Pressure cooker**—a strongly built container of aluminum or tin-coated steel equipped with a tight-fitting cover which clamps down so the steam is held in under pressure. It has a pressure gauge to register pounds of pressure. A safety valve opens to let out steam when the pressure becomes too high. There must be an opening for letting out the air and a petcock for closing this opening when the steam is to be retained. Some cookers have a combined safety valve and petcock.

**Preparation of Equipment for Canning**

Two general types of jars are in use. The shoulder seal type includes the regular mason screw lid and the glass lid with wire bail and clamp. The top seal type includes the metal lid with composition gasket and screw band, and the glass lid with separate rubber and screw band. Testing is important because if the seal is imperfect for any reason, products will not keep. Jars and lids should be tested where the seal comes. If a shoulder seal type, see that the shoulder is free from nicks; if a top seal type see that the top edge is free from nicks. Place shoulder seal lids on a flat surface to see if the edge is even. The rubber should not crack when folded; it should stretch and spring back and fit closely, requiring a little stretching to get it around the neck of the jar. Wartime jar rings stretch very little.

**Testing**

To Test Regular Mason Screw Lids: Put hot water in the jar, place rubber and lid in position, make a tight seal and invert the jar. Allow jars to stand inverted five or ten minutes to detect slow leaks. If the edge of the lid is sharp, it should be rubbed with a metal surface until dull so it will not cut into the rubber.

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**Water bath**—wash boiler, deep kettle, or pail with tight-fitting cover. Container must be deep enough so the water will cover jars. It should be fitted with a rack or false bottom to protect the jars from direct heat from bottom and allow circulation of water around the jars. A rack of wire mesh at least three-fourths inch high, wire baskets which have raised bottoms, or a weighted wooden rack may be used.

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**Main parts of pressure cooker.**

- **Safety valve**
- **Steam-pressure gauge**
- **Petcock**
- **Thumb-screw clamps**
- This wire basket combines false bottom and lifter.

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**Testing**

- **A**—Regular mason screw lid; **B**—Glass lid with wire bail and clamp; **C**—Metal lid with composition gasket and screw band; **D**—Glass lid with separate rubber and screw band.
Screw lids that have been pried open often permit leaks. An uneven edge can sometimes be remedied by placing the lid on a flat surface and rubbing the edge with the dull side of a knife blade until it lies flat on the table and touches at all points. (Do not open the jar with a knife if you expect to use the lid again. If the lid does not turn, pull out the rubber or invert the jar in hot water.)

To Test Metal Lid with Composition Gasket and Screw Band: See that the gasket is in good condition. It should not be cracked or pulled away from metal lid. It should be pliable, not granular or hard. The screw band should not be corroded or rusty. This type of jar cannot be tested with water before canning because the composition gasket does not form a tight seal until it cools after the product has been canned. After the canned product has cooled a tight seal is indicated by the lid curving inward and by a clear ringing sound when the lid is tapped with a metal spoon.

To Test Glass Lid with Separate Rubber and Screw Band: Test rubber. See that the screw band is not corroded and the glass lid is free from nicks.

To Test Glass Lid Jars with Wire Bail and Clamp: Place a rubber and lid on the jar, and put the wire in place over the top of the lid. If the bail does not go on with a snap when the side clamp or tightening lever is up, remove it from the jar and with the thumbs bend it down in the center. (See illustration.) The ends of the bail usually need to be pressed inward before it can be replaced on the jar. This is done by holding the center of the bail firmly where it has been bent in the left hand, allowing the ends to stand up. With the palm of the right hand, bend in one end and then turn the bail and bend in the other end enough that the bail will fit snugly on the jar.

Return the bail to the jar, put it in place over the top of the lid, and see if it goes into the groove with a snap. If so, put hot water in the jar, make a tight seal by pressing the tightening lever down, and test again by inverting the jar. If there is no defect in the jar and the jar leaks, tighten the bail again.

If the bail is too tight, it should be loosened by bending in the opposite direction to that given for tightening. This testing of the bail should be done every time the jar is used for canning.

Cleaning and Boiling

After testing, wash and rinse the jars, lids, and rubbers thoroughly. Use warm, clean, soapy water, and rinse well in clear water.

After testing and cleaning the jars, and lids with separate rubbers, put them in cold or warm water and bring to boiling. If desired, place the rubber on jar before it is put into the water, since it is difficult to put a rubber on a hot jar. It also saves delay before filling the jar which is especially important with open-kettle canning. Jars and lids for open-kettle canning should be sterilized by boiling 15 to 20 minutes. When jars are packed and then processed for at least 15 minutes, they do not need to be sterilized first; but they should be clean and hot when filled. Jars may be boiled in the processing water to save space on the stove. Keep jars hot until used so it will be safe to fill them with hot products or plunge into boiling water after filling. Pour boiling water over lids with composition gasket and allow to stand until used. When using a pressure cooker, jars may be heated by inverting them on the false bottom. Place lid on cooker but do not fasten the clamps.
Methods of Canning

Kettle Processed or Open Kettle Method:

Cook product in a kettle, place in a clean hot jar, fill to the top, and seal. Satisfactory for fruits and tomatoes and also for pickles in which vinegar or heavy syrup is used. Not suitable for non-acid products.

Disadvantages—The product is exposed to the air after processing and air in the top of the jar is not processed. Molds or other living organisms may cause spoilage unless the temperature is sufficient to destroy them.

Jar Processed Method in Boiling Water Bath and Pressure Cooker:

Precook, pack boiling hot product into jar, fill with boiling hot liquid, seal, and process. When both product and liquid are hot, less time is required for the contents of the jar to reach processing temperature.

If the product is packed into the jar cold, fill with boiling hot liquid, make a partial seal, process and then make a tight seal.

Advantages—The safest method for non-acid products. Product keeps its shape and flavor better. Successful method because there is little chance for bacteria to enter the jar after processing. Mold is never found on jar processed products if they are properly processed and sealed.

A steam pressure cooker is preferred for processing non-acid vegetables and meats but the boiling water bath has been used with success by careful workers. For altitudes of 2000 feet and above, the pressure cooker method of processing should be followed. Temperatures of 240°F. to 250°F. are recommended for adequate sterilization of foods low in acidity. The water of the hot water bath never reaches a temperature above the boiling point (212°F.) and the contents of the jars will not be hotter than the water around them.

Botulinus Poisoning

The spores of clostridium botulinum, a soil organism which causes food poisoning, may not always be destroyed at a temperature of 212°F. even though this temperature is maintained for at least six hours. If such spores are present, and if they survive processing and germinate in a sealed container, enough toxin or poison may be developed to cause serious illness or even death. Enough boiling destroys the toxin but a number of deaths have been caused by eating or tasting green string beans which were processed in the water bath but which were not boiled before tasting.

For the above reasons the Bureau of Home Economics, Washington, D. C., advises against the water bath method of processing non-acid foods. However, if a pressure cooker cannot be obtained and the water bath is risked for processing non-acid foods, the Bacteriology Department of the University of Nebraska has approved the processing time given in this circular.

Steps in the Jar Processed Method

1. Prepare jars and assemble equipment. Test, wash, rinse, and boil jars, lids and rubber. It is often good planning to test, wash and rinse jars, lids, and rubber the day before canning. Be sure all equipment used in handling products for canning is clean. Soiled utensils increase the chance of spoilage.

2. Select good products. Sort or grade for size, color and ripeness. A good product is fresh and firm. Can as soon after picking as possible. If products must be kept a short time, remove any which show decay, bruises or other imperfections and keep the remainder in a cool place in small amounts, well ventilated. Select the best for canning. Imperfect fruit may be used for jam or butter if the poor spots are removed.

3. Wash and prepare according to recipe. Soil contains living organisms which are especially difficult to destroy, therefore wash products thoroughly until the rinse water is clear. Remove products from water as soon as they are clean. Always lift products out of water rather than pouring water off of them. If the water bath method is used for non-acid vegetables take particular care in washing them.

Tomatoes are scalded in order to remove the skins easily. Ripe products
are scalded in a shorter time than slightly underripe ones. For convenience
in handling, scald them in a wire basket or piece of cheese cloth.

4. Precook or partially cook before placing in jars. Non-acid foods should
always be precooked and packed hot. Precooking removes air, shrinks the pro-
duct, makes packing easier and hastens processing because the foods are hot
when placed in the canner.

The method and time of precooking varies with the product. Some prod-
ducts are boiled for a short time. Greens may be steamed in a tightly covered
kettle with just enough water to prevent burning. Use this liquid when
filling jars because it has food value. Steaming may be done in a pressure
cooker. In this case leave the petcock open and do not clamp the lid.

5. Pack. Remove jars one at a time from boiling water. Do not place jar
on a cold surface, a board of cloth may be used, or the jar may be set in a
pan containing a little hot water. See that rubber is in place. Pack quickly
so that the precooked food remains hot. Use a sufficient proportion of liquid
to solids to prevent too dense a pack and work out the air bubbles with a knife
blade or spatula.

Allow one-fourth to one-half inch of head space in all jars except those
containing starchy foods (corn, peas and lima beans); they require about one
inch because of greater expansion. The solid material in jars should be covered
by liquid.

As each jar is packed, carefully wipe the rubber ring and sealing edge
of the jar with a clean cloth if necessary to remove any particles of food.
Pack quickly so the precooked food remains hot.

6. Exhaust and adjust lids.

If the content of the jar is not boiling hot, make a partial seal to allow for
removal of the air which is called exhausting. In this case, the air is partially
removed during processing.

If the contents of the jar is boiling hot, make a complete seal. In this
case, steam from the boiling product forces out most of the air before sealing.

7. Process required length of time, Pressure Cooker Method. Pour boiling
water into the cooker to a depth of one or two inches. Observe the water in
the cooker each time after removing jars and add more if necessary to prevent
its boiling dry.

Follow step 6.

Place each jar in the water bath as soon as packed.

Have the water in the container boiling before putting in the filled jars.

To prevent breakage, the jars should be boiling hot and be filled with hot
product.

Be sure the jars are far enough apart and the rack on which they are sup-
ported is arranged so the water can circulate freely under and around them.

When all the jars are in the canner, see that the level of the water comes
over the lids about one or two inches. If necessary, add more boiling water
so that it covers the jars throughout the processing period.

Count time as soon as the water begins to boil vigorously.

Increase the time, if the altitude is over 1000 feet. See page 23.

Keep the water boiling during the full processing period.

As soon as the process is up, remove the jars from the water.

If the jars have been partially sealed, remove one at a time and seal tightly.

8. Cool. Cool, avoiding cold drafts. Place jars right side up far enough
apart so they will cool quickly. Do not cover with a cloth as this retards
cooling. Do not disturb seal after the product is cold.

9. Label. Wipe the container clean and label with the date of canning
and method of processing.

10. Check results. If space permits, hold canned products at room tempera-
ture for a week or 10 days where they can be examined from time to time.
to be sure they are keeping. If any show signs of spoilage, examine all of that lot carefully.

11. Store. Store in a cool, dry place. Protect glass jars from light so the food will not fade in color. Wrap in paper or place in jar boxes. The quality is generally better if products are used within the first year after canning.

### Sirups

<table>
<thead>
<tr>
<th>Proportions sugar and water</th>
<th>Sirup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>2/ c. sugar to 1 c. water</td>
</tr>
<tr>
<td>Moderately light</td>
<td>1 1/2 c. sugar to 1 c. water</td>
</tr>
<tr>
<td>Medium</td>
<td>3/4 c. sugar to 1 c. water</td>
</tr>
<tr>
<td>Moderately heavy</td>
<td>1 1/4 c. sugar to 1 c. water</td>
</tr>
<tr>
<td>Heavy</td>
<td>1 1/2 c. sugar to 1 c. water</td>
</tr>
</tbody>
</table>

### Canning Fruits Without Sugar

Sugar may or may not be added, as desired, in the canning of fruits. The shape, color, and flavor of the fruits are retained better when some sugar is added. Fruits for pie making are commonly canned without sugar. Juicy fruits, such as berries, cherries, currants, and plums, should be canned in their own juices when sugar is omitted. Water is not required. Extract the juices from the riper fruits by crushing, heating, and straining. Pack the remaining fruits closely into containers without preheating, add boiling hot juice to cover, partially seal the glass jars and process. Or give the fruits a short pre-cooking, such as simmering 2 to 4 minutes, pour into containers at once, seal and process.

The less-juicy fruits, such as apples, peaches, and pears, require the addition of water when canned without sugar. To preserve the natural fruit flavor, use a minimum amount of water. Follow the usual directions for canning, substituting water in place of the sirup.

### Canning Fruits With Part Sugar

The amount of sugar used in canning during war time should be in harmony with government regulations. For most products, this will mean using a sirup no heavier than the moderately light sirup given in the table. Sirup or honey may be substituted for one half of the sugar. For example, instead of making a syrup with 1 cup sugar and 2 cups water, you may use 1/2 cup sugar, 1/2 cup syrup or honey, and 2 cups water.

### Processing Time

The time given for processing with the exception of water bath time for non-acid vegetables is based on Farmers' Bulletin No. 1762, "Home Canning of Fruits, Vegetables and Meats" and AWI-41 "Wartime Canning of Fruits, Vegetables." The Bureau of Home Economics recommends a time which is satisfactory in all parts of the United States and advises people in the states to vary it according to conditions. However, the following is an important precaution: Never shorten the time for processing non-acid vegetables and meats. The reason for this precaution is that products which are not acid are more difficult to keep and botulinus poison develops more readily in them than in acid products.
### Asparagus
Must be fresh and tender. Pick over and discard tough stalks. Wash thoroughly. It may be necessary to remove the scales from stalks in order to wash off all particles of soil. Sort stalks according to size. Tie in bundles, place in a sauce pan with boiling water over the lower portion only, cover tightly, and boil 2 to 3 minutes or cut in half-inch lengths, add boiling water almost to cover and boil 2 minutes. Pack boiling hot into jars, cover with hot cooking liquid, add 1 teaspoon salt per quart.

### Beans, String
Pick over and grade carefully, discard the more mature ones. Wash thoroughly, lifting the beans out each time. Wash until water is free from particles of soil before cutting. This is especially important with beans because particles of soil may lodge inside of the bean when it is cut. Remove ends and strings if necessary. Add boiling water almost to cover and boil for five minutes. Pack hot, cover with hot cooking liquid, add 1 teaspoon salt per quart.

### Beets
Leave roots and at least one inch of stem on while precooking to prevent bleaching. Scrub or wash thoroughly and precook about 15 min, or until the skins slip. Skin, trim and pack into jars. Add 1 teaspoon salt per quart. Cover with boiling water; bring to boiling and pack hot, not too solidly and prevent too dense a pack.

### Carrots
Select young tender carrots, wash pods. Shell, wash, cover with boiling water; bring to boil. Pack hot, cover with hot cooking liquid and add 1 teaspoon salt per quart.

### Greens
Use tender young peas. Wash pods to remove soil. Shell, wash, lifting peas out of water. Add hot water to cover simmer 5 min. Pack hot in pint jars. Cover with hot cooking liquid. Add ½ teaspoon salt to each pint.

### Peas, Green
Select young tender peas, pick over and grade carefully. Wash pods to remove soil. Shell, wash, lifting peas out of water. Add hot water to cover simmer 5 min. Pack hot in pint jars. Cover with hot cooking liquid. Add ½ teaspoon salt to each pint.

### Pumpkin and Squash
Wash, peel and cut into 1 to ½ inch cubes. Add 2 tablespoons of water and simmer until heated through, stirring occasionally. Pack hot, add 1 teaspoon salt to each quart and cover with hot cooking liquid.

---

### Change of Time for Higher Altitude

#### Processing in Boiling Water Bath. The times given in this table for processing in boiling water apply only to places with altitudes of 1000 feet or less. If the altitude is over 1000 feet, increase the time ten per cent for each additional 500 feet.

#### Processing in Pressure Cooker. The times given for processing in the pressure cooker apply from sea level to 2000 feet. If the altitude is over 2000 feet, increase the pressure one pound for each additional 2000 feet.

#### Precautions in the Use of Canned Foods

First follow directions for canning carefully, then follow the precautions below for using canned food and there need be no fear of poisoning. To be sure that food is wholesome, inspect carefully before using. If vegetables and meats are canned in a water bath, it is advisable to use them within a year after canning.

Remember, the person opening the can is responsible to those eating the product.

#### Before Opening Glass Jars: The cover, if metal, should be firm and flat or curved slightly inward. There should be no sign of leakage around the rubber ring or elsewhere.

#### Tin Cans: Both ends should be flat or curved slightly inward. Neither end should bulge or snap back when pressed. All seams should be tight and clean, with no trace of leaks.

#### When Opened. The contents should appear sound, normal in color, and the liquid free from unusual cloudiness. As the can is being opened, notice whether there is an outrush of gas or spurtling of the liquid. These indicate spoilage. If the air sucks inward, this is a good sign and shows that the vacuum seal has not been broken.

Smell the contents at once. The odor should be characteristic of the product. Any "off" odor probably indicates spoilage. Be sure that the person opening the canned goods has a keen sense of smell.
Look at the contents carefully to see whether they appear sound and natural in color and texture.

If the can is tin, notice the appearance of the inside. It should be clean and bright, not extensively blackened or corroded.

Be absolutely safe. Do not taste canned non-acid vegetables and meats before boiling.

This precaution should be taken in using all home canned non-acid foods but it is especially important if the boiling water bath has been used for processing.

Empty the canned non-acid vegetables or meat into a sauce pan, cover and boil, being sure that the product is at a full rolling boil for 10 minutes. Even if the food is eaten cold as in salads, this precaution should be observed.

Boiling destroys the toxin or poison produced by certain bacteria. Boiling does not ordinarily destroy bacterial spores. In case the liquid in the can is not sufficient, add boiling water before boiling. Note the odor of the hot food carefully because heating sometimes brings out odors not noticed in cold food.

Food which shows signs of spoilage should be boiled for 10 minutes before discarding or throwing out where live stock such as chickens may eat it. If there is an objectionable odor, the contents may be emptied into toilet so there will be no danger of poisoning livestock.

Problem III. Questions and Answers on Canning

When teams are preparing demonstrations they naturally think of many questions which people are likely to ask about canning. This problem answers some questions and calls attention to others which were covered in Problem II. Club members may enjoy adding to this list and then having a contest to see how many questions each can answer.

1. Why should we can surplus garden and orchard products?
   See Problem II.

2. Why is it important that products be fresh?
   "Flat sour" may develop in vegetables which in time spoils them. The flavor of all products is better when they are fresh.

3. What precautions are necessary to avoid spoilage called "flat sour?"
   "Two hours or less from garden to can" may prevent flat sour from developing before canning. Have table tops, stoves and all utensils clean. Experience at the community canning centers showed it was necessary to wash tables and equipment when canning corn over a period of more than two or three hours. Metal surfaces are easier to keep clean than wood surfaces. Use perfectly fresh products, prepare them properly, pack one jar at a time, place in the canner as soon as it is packed and begin heating immediately. Cool jars as rapidly as possible but avoid drafts when canning in glass jars. Delay at any stage of the process is dangerous.

4. How may delay be avoided when canning home grown products?
   Assemble equipment, test and wash jars, start heating them, have plenty of hot water, gather products, prepare and can them immediately.

5. Why should jars be tested before filling?
   Defective jars cause spoilage and should be discarded.

6. How are jars and lids prepared for canning?
   Wash in hot soapy water and rinse well. Place in a pan of warm water with a rack or cloth in the bottom to prevent bumping. Bring to the boiling point and keep hot until used. If the jars are inverted on the false bottom a smaller amount of water may be used as steam from the boiling water fills the jars. Jars may also be inverted in the pressure cooker and kept hot until ready to use. In this case, place the lid on the cooker but do not clamp it on. Dip jar rubbers into boiling water and place on shoulder seal jars before filling them. To save handling when hot, rubber may be placed on jar before it is heated.

    Pour boiling water over metal lids with composition gasket and allow to stand until used.

7. Is it necessary to sterilize jars and lids before canning?
   Jars for open-kettle canning and jars in which food is processed less than 15 minutes should be sterilized by boiling for 15 to 20 minutes. All jars should be clean and hot when filled.

8. Why should jars, lids and rubbers be hot before filling?
   Cold jars may break when hot food is put into them. The rubber is more pliable when it is hot.

9. Why is grading of products important?
   Small and immature vegetables cook more quickly than large ones. Ripe fruits cook more quickly than under-ripe. Therefore, the time for processing varies with the size and ripeness.
10. Why is it necessary to wash vegetables carefully? Because soil contains bacteria which are especially hard to destroy.

11. What precaution is taken with a pod vegetable like beans? Wash thoroughly before stringing and cutting because it is difficult to remove dirt which may lodge inside of the pod if beans are washed after cutting.

12. How are peaches washed to preserve their shape? Place them in a strainer and pour water over them until the water which drains off is clear. The strainer should not be loaded too heavily.

13. Why should you lift the products out of the water rather than pour water off of them? Because lifting them out leaves the particles of grit in the water.

14. What is precooking? Precooking means partially cooking the product before packing the jar.

15. How are products precooked? The method and time of precooking varies with the product. Some products are boiled for a short time, some are steamed and others, such as meats, may be seared in hot fat or in the oven before packing.

16. Give reasons for precooking. Precooking removes air, shrinks and wilts certain products so it is possible to have a fuller pack. Precooking reduces the processing time because products are packed while hot.

17. Why are a few products such as peaches and tomatoes cold dipped after scalding? A few products may be cold dipped to remove the skins more easily, and make it possible to handle the product with greater ease.

18. Is it necessary to keep jars hot while packing by placing them in a pan of boiling water? It is not necessary to keep jars hot while packing if you are using the hot-pack method. However, if products are cooled before placing into the jar or packing takes too long, it is advisable to keep the jar hot because the jar may be cooled enough to break when it is plunged into the processing water.

19. How are partial and tight seals made with different jars? See Problem II.

20. Explain processing in the pressure cooker. In the boiling water bath. See Problem II.

21. Why is the boiling water bath method suitable for canning fruits and tomatoes? Bacteria are easily destroyed at boiling temperature when acid is present.

22. When using a water bath, how can the temperature be regulated? Keep the water one inch above the lids of the jars and keep it boiling during the entire processing period.

23. Why is the pressure cooker rather than the boiling water bath recommended for canning non-acid vegetables and meats? A pressure cooker produces the higher temperature which is necessary to destroy the spores of bacteria in non-acid foods.

24. What is the direction about exhaust steam from a pressure cooker at the beginning of the processing period? Allow the petcock to remain open until steam escapes from it in a steady stream from 4 to 7 minutes, indicating that no air remains inside.

25. Is the steam cooker without pressure recommended for canning? No, because frequently the product does not reach the boiling point of water. The temperature lowers whenever the water stops boiling or the door is opened allowing steam to rush out of the cooker. It is dangerous to use a steam cooker without pressure for non-acid products because the processing temperature is never higher than boiling.

26. Is the oven method recommended for canning non-acid vegetables or meats? No, because of the difficulty of maintaining a constant temperature inside of the jars. An oven temperature of 250° to 275° F. is necessary to obtain 212° F. inside of the jars. The oven may be used as one method of heating the boiling water bath.

27. How should canned products be cooled? How stored? See Problem II.

28. What precautions are essential when using the kettle processed method? Dip jar fillers and any utensil which touches the product into boiling water immediately before using. Be careful not to touch jars, rubbers or the inside of the lid after boiling because fingers are germ carriers. Be careful not to spill juice on the rubber.

29. How may loss of liquid be prevented when canning in the water bath? Dip a false bottom that permits water to circulate under the jars. Keep water boiling during entire processing period. Keep water one inch above lids of jars. It is a good plan to have a teakettle of boiling water available for replenishing. Do not fill jars to the top. Allow ¾ to ½ inch headspace.

30. How may loss of liquid be prevented when canning in the pressure cooker? Keep an even pressure throughout the entire processing period. Allow the indicator on pressure gauge to return to zero before opening the petcock. As soon as the indicator reaches zero, open the petcock gradually and unscrew the lid. Do not hasten the cooling of your cooker by placing it in cold water or on a cold surface.

31. What other reasons may be given for shrinkage and loss of liquid? Lack of or insufficient precooking. Lids adjusted too loosely. Crowding jars and filling too full. One-half inch of space in the top of jars should be sufficient if the product has not been crowded into jar.

32. This question often comes up in canning club work. "I used the processing time given in the canning problem and my products were over-cooked. May I decrease the time?" Never shorten the time for processing non-acid vegetables and meats. If you have had success using a shorter time than that given for acid fruits and tomatoes, it should be safe to continue using it for those products.

33. What precaution is given about tasting canned products? To be absolutely safe do not taste canned non-acid vegetables and meats before boiling. Boiling destroys the botulinus toxin or poison if present.

34. How may you feel safe in using non-acid vegetables and meats which have been canned in the boiling water bath? Boil in an uncovered pan five minutes shortly before using even though there is no sign of spoilage.

35. Why is it necessary to check the gauge on a pressure cooker? Because the pressure may be lower than the gauge indicates. Inaccurate pressure gauges may result in spoilage.

36. Where can pressure cooker gauges be tested? Inquire of your county agricultural or home extension agent.
Problem IV. Judging and Exhibiting

Score Card for Canned Vegetables and Fruits

Flavor and odor are important factors in judging vegetables and fruits. However, when it is not advisable to open jars, only the first four divisions of the score card are used. Multiply each of the first four divisions by two to get the total score when jars are not opened. Only in extreme cases is it advisable to open club members' jars as this would bar them from exhibiting the products again.

Container
- Clean, clear glass. Specified size. Tight seal.
- Attractive, neat label.
- Uniform jars and labels in exhibit. Labels uniformly placed.
- Tin container—bright, ends flat or slightly concave.
- No swelling or bulging.

Pack
- Full but not crowded.
- Size—convenient for serving.
- Arrangement—attractive.
- No foreign matter as sand, grit, corn silk, unnecessary bits of stem, seed, core, pod, leaf, etc.

Liquid
- Right proportion of liquid to be served with product.
- Should cover product and practically fill jar.
- As clear as possible, considering the product.
- Appropriate color and consistency.
- Not discolored, mushy or unnecessarily cloudy.
- No bubbles indicating spoilage.

Appearance and texture—judged before opening
- Color—characteristic of cooked product.
- Not unnecessarily blanched or darkened.
- Quality—good original product, canned at proper stage of maturity.
- Not under-ripe, over-ripe, tough, hard, woody, or stringy.
- Firm with no defects.
- Shape—well preserved, not over- or under-cooked, frayed or mushy.
- Texture—more accurately judged by tasting.
- Uniformity—size of pieces uniform, uniform maturity.

Flavor and odor—judged after container is opened
- Pleasing flavor—characteristic of fresh cooked product.
- No suggestion of staleness under- or over-ripeness, under- or over-cooking or spoilage.

TOTAL SCORE 100

Judging helps club members to recognize both low and high quality products. They learn the reasons for poor quality and how to produce products of high quality. Judging encourages one to raise the standard of her products. If a jar places down because of a mushy product, a good club member will be careful to avoid over-cooking in order to have a more desirable product next time. Begin judging as soon as canned products are available and judge whenever there is an opportunity.

An exhibit of club work is one of the 4-H Standard Club goals. Carefully planned and well arranged exhibits are educational. They show what has been accomplished, give new ideas and stimulate club members to do their best work. If two local club exhibits can be held, it is better to have one early in the canning season and one later. An early exhibit encourages club members to can the early products and as a result they will have a better variety of canned products. In connection with the later exhibit, a judging contest may be held to select the best products for county and State Fair exhibits.

4-H canning exhibits, instead of being simply rows of attractive jars, should tell a nutrition story.

Placing Canned Products

Placing may be done by scoring or by comparison. If two jars are scored or graded, the one with the highest grade places over the other. With the score card and jar of products before you, consider each division of the score card and determine how nearly the jar being judged measures up to the amount indicated under perfect score and grade it accordingly. Notice the difference in values of the various divisions of the score card. Flavor and odor count most and container least.

Placing is done more quickly by comparing jars than by scoring them. For example, jar 3 is cleaner than jar 2 but jar 2 may place over 3 because it has a fuller pack, a clearer liquid, and the product has a more natural color. Any one of these reasons may be sufficient to place 2 over 3 because of the difference in value as shown on the score card.

Preparing Exhibits

When doing your home canning, sort out the most attractive products for exhibit. This is a good way to avoid wasting products as sometimes happens when canning only exhibit jars. For example, fruit should be uniform in size, ripe yet firm and of the finest color and flavor. Careful grading of products is essential for several reasons. Under-ripe and over-ripe products usually differ in size, color, and texture from the perfect ones and require different periods of time for processing. One second grade product may spoil the appearance of the whole jar.

When putting away the jars after canning, sort them, placing the best in a certain place for special occasions and for exhibit.

When selecting jars for exhibit, keep in mind the points of the score card. The appearance of the container has a great deal to do with the general appearance of the canned product. Green glass jars may be used for green products but a clear glass is best for other products, especially yellow and red. If a lime deposit adheres to the jars, it should be removed with denaturated alcohol or cleanser and soap, so that the glass shines. The word "uniform" applies to an exhibit of two or more jars. Uniform jars and labels are desirable. The name of product, name and address of exhibitor and the premium number should be written plainly on a label pasted on the bottom of each jar.

The importance of this information is evident when the jars become separated as they sometimes do when exhibits are being judged.
Problem V. Judging Menus

When judging menus for a day, compare them with the 4 3 2 2 2 2 daily standard for good nutrition for growing boys and girls. Menus which meet this standard score high in food value because they contain the most essential minerals and vitamins. Milk is our best source of calcium. Leafy, yellow or green vegetables, tomatoes and butter are excellent sources of Vitamin A. Citrus fruits and tomatoes are the best sources of Vitamin C. Vitamin C is destroyed by cooking, but short cooked products such as tomatoes retain a considerable amount. All raw fruits and vegetables contain some C. Whole grain products and lean pork are among the best food sources of Vitamin B₁. Whole grains, greens and protein foods such as lean meat, eggs and dried legumes are good sources of iron and vitamin G. Fruits, vegetables, and whole grain products contain cellulose which is valuable for bulk or roughage. The following table as well as the 4 3 2 2 2 2 standard will help us to tell whether meals contain Vitamins A, B₁, C, and G and calcium and iron.

### Checking Milk

The following table will help you figure the number of servings or cups of milk represented in a given menu:

<table>
<thead>
<tr>
<th>Approximate amount of milk in an average serving of the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drink (cocoa all milk)</td>
</tr>
<tr>
<td>Milk Toast</td>
</tr>
<tr>
<td>Milk Soup</td>
</tr>
<tr>
<td>Cereal, served with milk</td>
</tr>
<tr>
<td>Cereal cooked with milk</td>
</tr>
<tr>
<td>Cocoa, part milk</td>
</tr>
<tr>
<td>Desserts</td>
</tr>
<tr>
<td>Scalloped Dishes</td>
</tr>
<tr>
<td>Milk gravy</td>
</tr>
<tr>
<td>White sauce</td>
</tr>
</tbody>
</table>

### Checking Menus by the Standard

The first step in judging menus for a day is to check them by the 4 3 2 2 2 2 standard. A table like the one below will be helpful for recording the number of servings. For example, the following summer menu is recorded as sample menu:

**Breakfast**—Fresh pears, whole wheat cereal, top milk, creamed dried beef on toast.

**Dinner**—Meat loaf with tomato sauce, scalloped potatoes, cabbage and carrot salad, bread, butter, apple pie, milk.

**Supper**—Cheese omelet, sliced tomatoes, bread, butter, iced tea.

<table>
<thead>
<tr>
<th>Meal</th>
<th>Number Servings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td>Sample Menu: 1</td>
</tr>
<tr>
<td>Dinner</td>
<td>Menu No. 1: 2</td>
</tr>
<tr>
<td>Supper</td>
<td>Menu No. 2: 3</td>
</tr>
</tbody>
</table>

*Y means yellow, g—green, r—raw, and t—tomatoes.

Record the number of servings in each menu of a class and compare with the 4 3 2 2 2 2 standard. Placing a menu depends on how nearly it meets the standard. The menu which either meets the standard or comes nearest meeting it places first, the next second, and so on.

### How to Figure Servings in Sample Menu

- Milk, 2 cups—cereal ½ c, creamed beef ¼ c, potatoes ¼ c, beverage 1 c.
- Vegetables, 3 servings—potatoes 1, salad 1 (r.g.y), tomatoes 1 (r.y.t).
- Fruit, 2 servings—Fresh pears 1, apple pie 1.
- Whole grain, 1 serving—Whole wheat cereal 1.
- Protein, 3 servings—Dried beef 1, meat loaf 1, cheese omelet 1.
- Butter, 2 tablespoons—Bread and butter 2.
### Score Card for Menus

<table>
<thead>
<tr>
<th>Category</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Values (Balance of foodstuffs)</td>
<td>50</td>
</tr>
<tr>
<td>- Good proportions of carbohydrate (starch and sugar)</td>
<td>15</td>
</tr>
<tr>
<td>- Fat and protein</td>
<td>15</td>
</tr>
<tr>
<td>Minerals (Calcium and Iron)</td>
<td>15</td>
</tr>
<tr>
<td>Vitamins (Especially A, B, C and G)</td>
<td>15</td>
</tr>
<tr>
<td>Bulk or cellulose</td>
<td>5</td>
</tr>
<tr>
<td>Appetite Values or Sense Appeal</td>
<td>30</td>
</tr>
<tr>
<td>- Flavor</td>
<td>10</td>
</tr>
<tr>
<td>- Color</td>
<td>10</td>
</tr>
<tr>
<td>- Texture</td>
<td>10</td>
</tr>
<tr>
<td>Economic or Management Values</td>
<td>20</td>
</tr>
<tr>
<td>- Cost of foods</td>
<td>10</td>
</tr>
<tr>
<td>(Use home produced food. Avoid expensive, 'out-of-season foods.)</td>
<td></td>
</tr>
<tr>
<td>Time needed for preparation</td>
<td>10</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
</tr>
</tbody>
</table>

The qualities which make us enjoy food are called appetite values. It is desirable to have variety in flavor, color and texture. Flavors and colors should go well together.

Economic or management values include wise use of money and time.