CHAPTER 7

Portion Control

OBJECTIVES

At the completion of this chapter, the student should be able to:

1. Identify methods of controlling portion size.
2. Identify portion sizes.
3. Find cost per serving.
4. Identify portion sizes using scoops or dippers.
5. Identify and find amounts of food to prepare.
6. Define and identify the terms E.P. (edible portion) and A.P. (as purchased).
7. Find the approximate number of serving portions.
8. Find the amount of food to order.
9. Find the amount of cost per portion.

KEY WORDS

portion control
portion size
edible portion (E.P.)
as purchased (A.P.)
cost per serving
shrinkage
yield
yield percentage

There is a saying in food service that a good rich stock is the key to kitchen production. However, portion control is the key to profits.

Portion control is a term used in the food service industry to ensure that a specific or designated amount of an item is served to the guest. It is also the method used to acquire the correct number of servings from a standardized recipe, a roast, vegetable preparation, cake, or pie. In addition, portion control is helpful in controlling food production, pricing the menu, purchasing, and controlling food cost.

ACHIEVING PORTION CONTROL

The best way to control portions is to use standardized recipes that state the number of servings a preparation will produce. However, a standardized recipe gives only the stated number of portions if the servings are uniform in size. To ensure uniform servings or portions, the preparation crew and serving personnel must be instructed in the use of ladles, scoops, scales, spoons, and similar measuring devices when portioning food.

Another method of achieving a successful portion control program is intelligent buying. Buy foods in sizes that portion well. Work out buying specifications that suit the portion need. For example, cooked smoked

Figure 7–1 *The chef is converting a recipe to determine the amounts needed to produce the required number of servings.*

ham can be purchased in many types and sizes. Purchase the kind that will produce a ham steak the diameter desired and one that produces little or no waste. Most link sausage, such as wieners, pork links, and frankfurters, can be purchased at a certain number (6, 8, or 10) to each pound. Purchase the count per pound that best suits the portion requirement. Select veal, pork, lamb, and beef ribs and loins that provide the size chop or slice desired. Appearance is important. If the food does not look appetizing, the first bite may never be taken.

Many foods can be purchased ready-to-cook and are purchased for absolute portion control. This is another controlling device to consider. Fish fillets, steaks, chops, and cutlets are all cut to the exact ounce desired. (See Figure 7–1.) The cost per pound is much higher because the more labor involved in fabricating a product, the higher the cost. To many food service operators the final cost is, in reality, lower when considering the following factors:

- no leftovers
- less storage required
- no waste
- no cutting equipment to purchase
- less labor cost

T I P S . . . To Insure Perfect Solutions

Always know the exact cost of the food that is placed on the plate in front of the guest.

Methods of Controlling Portion Size

There are five basic methods used in the food service industry to control portion size. They are listed in Figure 7–2 with a few examples of how each can be achieved.

Method	Examples
Weight	5 oz. pork cutlet 8 oz. roast beef 6 oz. roast pork
Count	8 fried scallops per order 2 Italian meatballs per order 3 corn fritters per order
Volume	2 oz. portion of Hollandaise sauce over vegetables No. 12 scoop of baked rice 3 oz. slotted spoonful of green beans
Equal Portions	Cake cut into 8 equal slices Pie cut into 7 equal wedges Pan of baked lasagna cut into 12 equal servings
Portioned Fill	8 oz. casserole of chicken pot pie 5 oz. glass of apple juice 4 oz. cup of chocolate mousse

Figure 7–2 *Methods of portion control*

Portioning Food

When portioning food for a particular establishment, remember that portions can be too large as well as too small. Therefore, before a portion policy is established, the manager (as well as the chef) should know the customers. This knowledge can be acquired by carefully observing the plates brought into the dishwashing area. Too much uneaten food left in a bowl or on a plate indicates that a portion is too large, or that the quality of the food does not satisfy the customer. In either case, the situation tells a story and must be corrected to improve customer satisfaction and control food cost. Too small a portion is usually indicated by plates and bowls that are scraped entirely clean. A satisfied guest usually leaves a very small amount of food on the plate or in the bowl.

When portioning food by weight, it is easy to find how much raw food is needed and how much should be prepared for a specific number of people. (See Figure 7–3.)

As an example, the Raven's Nest Restaurant expects to serve 325 hamburgers on Saturday evening. Each hamburger weighs 8 ounces before it is cooked. The following box illustrates how to determine how much raw hamburger to order.

Step 1: Number to be served = 325 hamburgers
Step 2: Multiply this number by the raw weight of each hamburger, 8 ounces
Step 3: 325 × 8 = 2600 ounces
Step 4: Divide the 2600 by 16 (ounces in one pound)
Step 5: The answer is 162.5 pounds, or 162 pounds and 8 ounces

Therefore, the formulas are as follows:
Number to be served × portion size = number of ounces needed
Number of ounces needed ÷ 16 (ounces in one pound) = number of pounds needed

Figure 7–3 *Precise portion control results in cost management.*

By finding the cost per ounce, a total cost is easy to calculate. Many chefs and managers become tired of hearing employees ask, *"How much should I prepare?"* By observing portion control charts posted in the preparation area and doing some simple figuring, employees can answer their own questions.

Once a portion policy is established, it should be posted in the kitchen. A typical portion chart is shown in Figure 7–4.

Chef Sez…

"Math is the most important subject to learn because, as a chef/owner, I use it all the time. I have to use math to price my prix fixe menu at a cost that will allow me to make a profit. It also has to be priced so my guests perceive a value, so they will return to the inn. I must keep a guest history of what items sell the best on my menu, so I can forecast how many of each appetizer, entrée, and dessert we will sell. Once I forecast my menu, I have to purchase the correct amount of food so I don't have too much (which would result in spoiled food) or too little (which would result in unhappy guests). The success of the Andrie Rose Inn is dependent on my culinary skills, along with a correct understanding and use of math."

Irene Maston
Certified Executive Chef
American Academy of Chefs
The Andrie Rose Inn
Ludlow, Vermont

Chef Maston and her husband, Michael, are the owners and innkeepers of The Andrie Rose Inn. They provide gracious accommodations in a circa-1829 country village inn with luxury suites. The Andrie Rose Inn has received the three-diamond rating from the American Automobile Association and an A+ Triple Crown Excellent rating from the American Bed and Breakfast Association's *Inspected, Rated & Approved Bed & Breakfasts and Country Inns*. The *New York Magazine* called it "a place not to be missed," and *USA TODAY* selected The Andrie Rose Inn as one of the "Top 10 Romantic Inns in the USA" in 1999. Chef Maston serves a four-course meal every Friday and Saturday, and changes her menu seasonally.

STEWS, BLANQUETTES, HASHES, ETC.	
Beef Goulash	7 oz.
Beef Stew	7 oz.
Veal Blanquette	6 oz.
Lamb Blanquette	7 oz.
Lamb Stew	7 oz.
Veal Stew	7 oz.
Oxtail Stew	10 oz.
Roast Beef Hash	6 oz.
Corned Beef Hash	6 oz.
Chicken Hash	6 oz.
Beef Stroganoff	7 oz.
Beef a la Deutsch	7 oz.

STARCH AND POTATO PREPARATIONS	
Baked	6 oz.
Au Gratin	4 oz.
Delmonico	4 oz.
French Fried	5 oz.
Mashed	5 oz.
Julienne	4 oz.
Lyonnaise	5 oz.
Croquette	5 oz.
Hash Brown	5 oz.
Escallop	4 oz.
Candied Sweet	5 oz.
Rice	4 oz.

VEGETABLES	
Asparagus, Spears	4 or 5 spears
Asparagus, Cut	4 oz.
Beans, Limas	4 oz.
Beans, String	4 oz.
Beans, Wax	4 oz.
Beets	4 oz.
Brussels Sprouts	5 oz.
Cabbage	5 oz.
Cauliflower	5 oz.
Carrots	4 oz.
Corn on the Cob	1 cob
Corn, Whole Kernel	4 oz.
Corn, Cream Style	5 oz.
Mushrooms, Whole	4 oz.
Onions	5 oz.
Peas	4 oz.
Squash	4 oz.
Succotash	3 oz.
Tomatoes, Stewed	4 oz.
Eggplant	4 oz.

DESSERTS	
Baked Alaska	1 slice—per Alaska
Compotes	5 oz.
Cake	1 slice—8 per cake
Ice Cream	4 oz.
Jubilee	5 oz. ice cream, 2 oz. cherries
Parfaits	5 oz. ice cream, 3 oz. sauce
Pie	1 slice—6 per pie
Pudding	5 oz.
Sherbets	4 oz.

SALADS	
Cole Slaw	4 oz.
Garden Salad	5 oz.
Ham Salad	5 oz.
Julienne	5 oz.
Macaroni	4 oz.
Potato	5 oz.
Toss	5 oz.
Waldorf	5 oz.

Figure 7–4 *Standardized portion chart (continued)*

STEAKS	
Chateaubriand (for 2 guests)	16 oz.
Filet Mignon	8 oz.
Sirloin	10 oz.
NY Strip	12 oz.
T-bone	12 oz.
Club	10 oz.
Porterhouse	14 oz.
Salisbury	8 oz.
Ham	6 oz.
Veal Steak	6 oz.
Lamb Steak	7 oz.

CHOPS AND CUTLETS	
Pork Chops (2)	4 oz. each
Lamb Chops (2)	4 oz. each
Veal Chop	6 oz.
English Lamb Chop	6 oz.
Veal Cutlet	6 oz.
Pork Cutlet	6 oz.
Escallop of Veal	7 oz.
Noisette of Lamb (2)	$3\frac{1}{2}$ oz. each
Pork Tenderloin	8 oz.
Beef Tournedos (2)	4 oz. each

POULTRY	
Fried Chicken	$\frac{1}{2}$ fryer ($3\frac{1}{2}$ lb. chicken)
Broiled Chicken	$\frac{1}{2}$ broiler (2 lb. chicken)
Roast Chicken	$\frac{1}{2}$ chicken (3 lb. chicken)
Roast Turkey	$2\frac{1}{2}$ oz. white meat (3 oz. dark)
Turkey Steak	5 oz. white meat
Boneless Turkey Wings	2 wings
Chicken a la King	6 oz.
Chicken Pot Pie	8 oz. plus crust
Chicken a la Maryland	$\frac{1}{2}$ fryer, 1 oz. bacon, 2 oz. cream sauce, 2 oz. corn fritters, 2 croquettes, 6 oz.
Chicken Cutlets (2)	6 oz.
Roast Duck	8 oz.
Roast Squab	1 bird
Roast Bnls Chicken Breast	5 oz. breast
Baked Stuffed Chicken Leg	1 leg, 3 oz. stuffing

Figure 7–4 *Standardized portion chart (continued)*

SEAFOOD	
Lobster, Broiled Whole	16 oz.
Lobster Newburg	5 oz. meat
Fried Shrimp	6 jumbo—8 medium
Shrimp Newburg	7 medium
Sauteed Shrimp	6 jumbo—8 medium
Softshell Crabs	2 crabs
Clam Roast	8 cherrystone
Steamed Clams	8 cherrystone
Fried Clams	8 cherrystone
Fried Oysters	7 select
Oyster Stews	6 select
Fried Scallops	8 small—6 large
Sauteed Scallops	8 small—6 large
Halibut	7 oz.
Cod	7 oz.
Sea Bass	7 oz.
Pampano	7 oz.
Red Snapper	6 oz.
Frog Legs	8 oz.
Mahi Mahi	7 oz.
Lake Trout	7 oz.
Rainbow Trout	8 oz.
Brook Trout	8 oz.
Smelt	6 fish, about 7 oz.
Salmon	7 oz.
Shad Roe	4 oz.
English and Dover Sole	7 oz.

Figure 7–4 *Standardized portion chart (continued)*

ROASTED MEATS	
Roast Rib of Beef	8 oz.
Roast Tenderloin of Beef	6 oz.
Roast Sirloin of Beef	6 oz.
Roast Round of Beef	5 oz.
Roast Leg of Lamb	5 oz.
Roast Loin of Pork	6 oz.
Roast Leg of Veal	5 oz.
Roast Fresh Ham	6 oz.
Baked Ham	6 oz.

Figure 7–4 *Standardized portion chart (continued)*

Example:

Appetizer	4 oz.
Salad	4 oz.
Entree	8 oz.
Potato	4 oz.
Vegetable	4 oz.
Bread & Butter	3 oz.
Dessert	6 oz.
Beverage	7 oz.
	40 oz. = $2\frac{1}{2}$ pounds

Figure 7–5 *Ideal portion sizes for one meal*

A point to remember when figuring portion sizes is that the average human stomach can only hold approximately $2\frac{1}{2}$ pounds of solid and liquid food comfortably. Therefore, oversized portions do not make customers satisfied, and usually create more waste. The intelligent restaurant operator figures portion sizes so that the customer has room left for dessert. An example of how the portion sizes for one meal should add up is given in Figure 7–5.

Cost Per Serving

To find the cost per serving, the total weight of the item is converted into ounces and divided into the total cost to find the cost of one ounce. The cost of one ounce is multiplied by the number of ounces being served. See the following formula to simplify this explanation.

Total weight × 16 = total ounces.
Total cost ÷ by total ounces = cost of 1 ounce.
Cost of 1 ounce × number of ounces served = cost per serving.

Example: A 5-pound box of frozen lima beans costs $6.24. How much does a 4-ounce serving cost?

Weight 5 lbs. × 16 = 80 ounces.
$6.24 (total cost) ÷ 80 (ounces) = 0.078 cost of 1 ounce.
0.078 (cost of 1 ounce) × 4 (ounces served) = 0.312 = $0.31 (cost of a 4-ounce serving).

The division is carried to three places to the right of the decimal point. Remember that the third digit is the mill, or $\frac{1}{10}$ of a cent.

Of course, if a cost per pound is given rather than a total, the number of pounds given must be multiplied by the cost per pound to find a total cost.

Example: Find the cost of a 3-ounce serving of succotash (mixture of two vegetables) if the following ingredients are used.

5-pound box lima beans @ $1.23 per pound.
$2\frac{1}{2}$-pound box corn @ $0.58 per pound.
To state this function as a math formula, it would be expressed as:
Total weight × unit price = total cost.
5 pounds × $1.23 = $6.15 total cost of lima beans.
$2\frac{1}{2}$ pounds × $0.58 = $1.45 total cost of corn.
$6.15 + $1.45 = $7.60 total cost of succotash.

To complete the problem, follow the same steps explained in the previous example.

$7\frac{1}{2}$ pounds × 16 = 120 ounces.
$7.60 total cost ÷ 120 ounces = $0.063 cost of 1 ounce.
$.063 cost of 1 ounce × 3 ounces = $0.189 or $.019 cost of a 3-ounce serving.

SUMMARY REVIEW 7–1

Work each problem. Round answers to the nearest cent.

1. A $2\frac{1}{2}$-pound box of frozen corn costs $1.55. How much does a 4-ounce serving cost?

   _____

2. When preparing succotash, a $2\frac{1}{2}$-pound box of frozen corn costs $0.58 per pound, and a 5-pound box of frozen lima beans costs $1.18 per pound. How much does a 3-ounce serving cost?

   _____

3. A $2\frac{1}{2}$-pound box of frozen peas and onions costs $0.72 per pound. How much does a $3\frac{1}{2}$-ounce serving cost?

   _____

4. If frozen asparagus spears cost $11.95 for a 5-pound box, how much does a 3-ounce serving cost?

_____

5. If a $2\frac{1}{2}$-pound box of frozen cut broccoli costs $1.70, what is the cost of a $3\frac{1}{2}$-ounce serving?

_____

6. A 5-pound box of frozen asparagus spears costs $2.39 per pound. How much does a $2\frac{1}{2}$-ounce serving cost?

_____

7. A $2\frac{1}{2}$-pound bag of frozen oriental vegetable mix costs $0.78 per pound. How much does a 4-ounce serving cost?

_____

8. A 3-pound bag of frozen Scandinavian vegetable mix costs $1.29 per pound. How much does a $3\frac{1}{2}$-ounce serving cost?

_____

9. A 2-pound bag of frozen whole baby carrots costs $0.82 per pound. How much does a 3-ounce serving cost?

_____

10. Find the cost of a $5\frac{1}{2}$-ounce serving of a beef stir-fry if the following items were used:

    3-pound bag frozen stir-fry vegetables @ $1.45 per pound.

    5 pounds of sliced fresh beef @ $3.80 per pound.

_____

PORTIONING WITH SCOOPS OR LADLES

Scoops, as mentioned in Chapter 5, are used to serve and portion such foods as dressings, rice, meat patties, croquette mixtures, ice cream, and muffin batters. Two examples are shown in Figure 7–6. They have a metal bowl or cup of known capacity, an extended handle, and a thumb-operated lever to release the item being portioned or served. A movable strip of metal on the inside of the bowl releases its contents. This metal strip contains a number to indicate the size of the metal cup; the larger the number, the smaller the cup. The number indicates the number of scoops it will take to make a quart. Figure 7–7 relates each scoop number to its approximate capacity in ounces and also to the approximate content of each scoop size in cups or tablespoons.

Figure 7–6 *Two examples of food scoops (courtesy of Hamilton Beach)*

United States Measurements			Metric Measurements	
Scoop number	**Volume**	**Approximate weight**	**Volume**	**Approximate weight**
6	$\frac{2}{3}$ cup	5 oz.	160 ml	140 g
8	$\frac{1}{2}$ cup	4 oz.	120 ml	110 g
10	3 fl. oz.	3 to $3\frac{1}{2}$ oz.	90 ml	85 to 100 g
12	$\frac{1}{3}$ cup	$2\frac{1}{2}$ to 3 oz.	80 ml	70 to 85 g
16	$\frac{1}{4}$ cup	2 to $2\frac{1}{2}$ oz.	60 ml	60 to 70 g
20	$1\frac{1}{2}$ fl. oz.	$1\frac{3}{4}$ oz.	45 ml	50 g
24	$1\frac{1}{3}$ fl. oz.	$1\frac{1}{3}$ oz.	40 ml	40 g
30	1 fl. oz.	1 oz.	30 ml	30 g
40	0.8 fl. oz.	0.8 oz.	24 ml	23 g
60	$\frac{1}{2}$ fl. oz.	$\frac{1}{2}$ oz.	15 ml	15 g

Figure 7–7 *Scoop or dipper sizes and approximate weights and measures in both U.S. and metric units. Weights vary with different foods; this is only a guide and is not exact.*

Ladles are used to portion sauces, gravies, soups, and other liquids. They come in assorted sizes, holding from 2 to 8 ounces. When ladles are used, portions will be consistent. The size, in ounces, is stamped on the handle. Figure 7–8 shows the ladle sizes most frequently used.

Figure 7–8 *Ladle sizes*

Ladle Sizes	
Size	**Weight**
$\frac{1}{4}$ cup	2 oz.
$\frac{1}{2}$ cup	4 oz.
$\frac{3}{4}$ cup	6 oz.
1 cup	8 oz.

DETERMINING NUMBER OF SERVINGS USING SCOOPS OR LADLES

Chefs and cooks must portion food out uniformly for both customer satisfaction and cost control. To find the number of servings of a particular amount of food or liquid when portioning with a scoop or ladle, divide the amount contained in the scoop or ladle into the amount being served. This function, as a formula, appears as follows:

Amount portioned ÷ scoop or ladle content = number of servings

Example: How many servings can be obtained from 4 gallons of ice cream if a No. 8 scoop is used to portion out the ice cream?

Step 1: Consult the chart in Figure 7–7 and find the No. 8 scoop. The chart says that the volume will result in $\frac{1}{2}$ cup. Note: we use the volume, rather than the weight, because different foods weigh different amounts. As we said in Chapter 5, the weight of one cup of cotton balls **does not** equal the weight of one cup of crushed stone.

Step 2: Since the volume of a No. 8 scoop is expressed in cups, we must convert the 4 gallons of ice cream to cups; to divide, like amounts are necessary. In other words, we can't divide cups into gallons; cups have to be divided into cups.

1 gallon contains 16 cups
4 gallons times (×) 16 = 64 cups
64 cups are in 4 gallons

Step 3: Cups are divided by the volume size of the scoop.

64 divided by (÷) $\frac{1}{2}$ cup

$\frac{64}{1} \times \frac{2}{1} = 128$ servings

Example: How many servings of soup can be obtained from 5 gallons of soup, using a $\frac{3}{4}$-cup ladle?

Step 1: Consult the chart in Figure 7–8 and find the $\frac{3}{4}$-cup ladle. The chart says that the volume will result in 6 oz.

Step 2: Since the volume of a $\frac{3}{4}$-cup ladle is expressed in cups and also ounces, we must convert the 5 gallons of soup into cups or ounces; to divide, like amounts are necessary. In other words, we can't divide cups into gallons; cups have to be divided into cups.

1 gallon contains 16 cups
5 gallons times (×) 16 = 80 cups
80 cups are in the 5 gallons
OR
1 gallon contains 128 ounces
5 gallons times (×) 128 = 640 ounces
640 ounces are in the 5 gallons

Step 3: Cups are divided by the volume size of the ladle.

80 divided by (÷) $\frac{3}{4}$ cup

$\frac{80}{1} \times \frac{4}{3} = \frac{320}{3} = 106.67$ servings

We can obtain 106 servings; the remainder is dropped, because it is not a complete portion.

OR

Ounces are divided by the ounce size of the ladle

640 divided by (÷) 6 ounces = 106.67

We can obtain 106 servings; the remainder is dropped, because it is not a complete portion.

In the above example, the authors used either cups or ounces because the ounces in a ladle are expressed in fluid ounces rather than weight. Therefore, the answer will come out the same.

SUMMARY REVIEW 7–2

In working the following problems, use information from Figures 7–7 and 7–8 to solve the problems. Use the maximum weight, if figuring out the problem with weight. For instance, if the problem calls for a No. 10 scoop, use $3\frac{1}{2}$ oz., not 3 oz. Only record complete servings; drop any remainders.

1. How many servings can be obtained from 15 gallons of soup if a $\frac{1}{2}$-cup ladle is used?

   _____

2. How many servings can be obtained from a quart of Cabernet Sauvignon reduction if a $\frac{1}{4}$-cup ladle is used?

   _____

3. Determine how many servings can be obtained from 12 pounds of bread pudding if a No. 10 scoop is used to portion?

   _____

4. How many servings can be obtained from 5 quarts of strawberry mousse if a No. 6 scoop is used to portion?

   _____

5. How many individual salads can be obtained from 7 pounds of tuna fish salad if a No. 10 scoop is used to portion?

   _____

6. How many clam fritters can be obtained from 5 pounds of batter if a No. 24 scoop is used to portion?

   _____

7. How many blueberry muffins can be obtained from $2\frac{1}{2}$ gallons of batter if a No. 12 scoop is used to portion?

   _____

8. How many servings can be obtained from $\frac{1}{2}$ gallon of cold pack cheese if a No. 16 scoop is used to portion?

_____

9. How many hush puppies can be obtained from $2\frac{1}{2}$ pounds of batter if a No. 30 scoop is used to portion?

_____

10. How many servings can be obtained from 12 pounds of mashed potatoes if a No. 8 scoop is used to portion?

_____

FIGURING AMOUNTS TO PREPARE

In any food service operation, it is constantly necessary to figure how many cans, boxes, or packages of certain food items are needed or must be opened in order to have enough food to serve a given number of people. This problem is solved by multiplying the number of people to be served by the portion size, giving the number of ounces needed. Next, the weight of the can, box, or package is converted into ounces, and the given amount is divided into the number of ounces needed. If a remainder results from the division, an additional container must be opened. By utilizing mathematics in this situation, guesswork can be eliminated and food preparation can be controlled. Steps to simplify this function are as follows:

Number of people to be served × portion size = ounces needed.
Pounds in container × 16 + ounces = ounces in one container.
Ounces needed ÷ ounces in one container = containers needed.

Example: How many No. 10 cans of green beans are needed to serve a party of 260 people if each person is to receive a 3-ounce serving and each can contains 4 pounds 6 ounces?

Step 1:
260 × 3 ounces = 780 ounces
Number of people to be served × portion size
= ounces needed to serve 260 people.

Step 2:
4 pounds × 16 ounces per pound
= 64 ounces + 6 = 70 ounces
Pounds in container × 16 + ounces in container
= content of 1 container.

Step 3:
780 ÷ 70 ounces = 11.14 cans
Ounces needed to serve 260 people ÷ content of one container
= 12 No. 10 cans needed to serve 260 people.

The preceding example shows that 12 No. 10 cans are needed to serve each of the 260 people a 3-ounce serving. When dividing the content of the can into the number of ounces needed, a remainder resulted, so an additional can was required.

SUMMARY REVIEW 7–3

1. A 3-ounce serving of peas is to be served to each of 180 people. How many boxes of frozen peas should be cooked if each box weighs $2\frac{1}{2}$ pounds?

   _____

2. A 3-ounce serving of wax beans is served to each of 55 people. How many cans of wax beans are needed if each can weighs 14 ounces?

   _____

3. How many No. $2\frac{1}{2}$ cans of pork and beans are required to serve 84 people if each can weighs 1 pound 10 ounces and each serving is 5 ounces?

   _____

4. A 3-ounce serving of peas is to be served to each of 110 people. How many boxes of frozen peas are needed if each box weighs 5 pounds?

   _____

5. How many No. 10 cans of green beans are needed to serve a party of 270 people if each person is to receive a $3\frac{1}{2}$-ounce serving and each can weighs 4 pounds 4 ounces?

   _____

6. How many No. 5 cans of potato salad are required to serve 96 people if each can weighs 3 pounds 6 ounces and each serving is $5\frac{1}{2}$ ounces?

   _____

7. How many $2\frac{1}{2}$-pound bags of corn will be needed to serve 360 people if each person is to receive a $3\frac{1}{2}$-ounce serving?

   _____

8. How many boxes of frozen chopped spinach are needed to serve a party of 186 people if each person is to receive a 3-ounce serving and each box weighs 4 pounds?

   _____

9. How many 5-pound boxes of frozen lima beans are needed to serve a party of 350 people if each person is to receive a 4-ounce serving?

_____

10. A $3\frac{1}{2}$-ounce serving of frozen peas and pearl onions is to be served to 145 people. How many 5-pound boxes will be needed?

_____

11. How many No. 10 cans of cut green beans are needed to serve a party of 180 people if each person is to receive a 3-ounce serving and each can weighs 5 pounds 10 ounces?

_____

12. How many 2-pound bags of Scandinavian vegetable mix will be required to serve a party of 85 people if each person is to receive a 4-ounce serving?

_____

13. How many No. $2\frac{1}{2}$ cans of diced beets are needed to serve a party of 42 people if each person is to receive a $4\frac{1}{2}$-ounce serving and each can weighs 2 pounds 5 ounces?

_____

14. How many No. 5 cans of tomato juice will be needed to serve 132 people if each person is to receive a 4-ounce serving and each can contains 48 fluid ounces?

_____

15. How many No. $2\frac{1}{2}$ cans of diced carrots are needed to serve a party of 168 people if each person is to receive a 3-ounce serving and each can weighs 1 pound 12 ounces?

_____

FINDING THE APPROXIMATE NUMBER OF SERVING PORTIONS

Finding approximately how many servings can be acquired from a given amount of food (as shown in Figure 7–9), or how much of a certain meat, fish, vegetable, or liquid food product should be ordered, are additional portion control concerns. For example, how many 12-ounce strip steaks can be cut from a short loin? How many 2-ounce meatballs can be acquired from a certain amount of ground beef? How many pounds of fish steaks must be ordered for a party of 80 people? How many gallons of orange juice must be ordered to serve a party of 250 people?

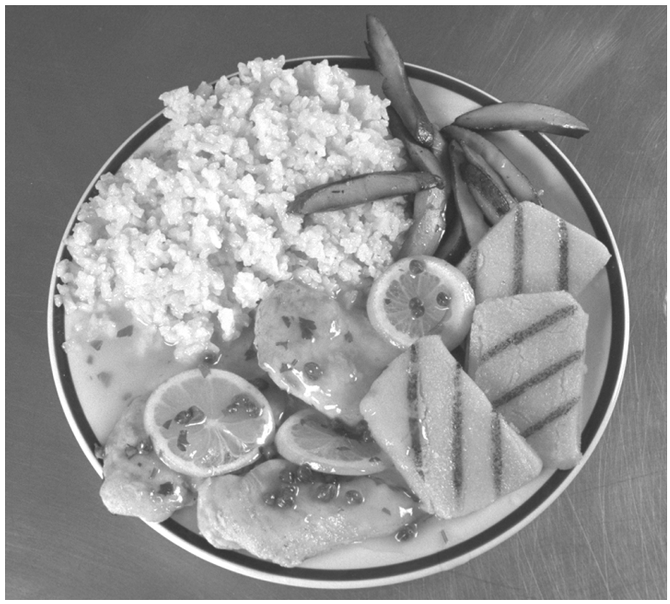

Figure 7–9 *The top picture illustrates appropriate portion control. The bottom picture illustrates an unappealing presentation and inappropriate portion control.*

The arithmetic involved in these problems is quite simple, and it is an essential part of a food service operation. This arithmetic must be accurate to keep inventories at a minimum, to control waste, and to maintain an effective portion control program.

As Purchased (A.P.)

When a raw food product is purchased in its natural state, this is called **as purchased (A.P.).** Before serving the food to the guests, an employee has to clean the product and prepare it for consumption. In the cleaning and preparation of the product, there will be a portion of the product that is discarded or can't be used. This is true of many products, whether it is

meat (tenderloin of beef), poultry (whole turkey), vegetables (case of romaine lettuce), or fruits (for fruit salad). The tenderloin cannot be taken from the case and put in the oven. It must be fabricated before it is ready to be cooked.

Edible Portion (E.P)

A product that is ready to be served to the guests is called an **edible portion (E.P.).** There are many products being offered to the food service industry ready to cook and serve without any waste.

Types of Edible Portion (E.P.) Products **Edible portion (E.P.)** products can be described in three ways. The easiest to understand are products that are purchased already fabricated and ready to be cooked. The second and third deal with products that belong to the **as purchased (A.P.)** definition. The second definition occurs when a chef purchases a product and has to trim it and fabricate it into equal portions. The third type of **edible portion (E.P.)** product occurs after food (generally meat) is roasted. It is removed from the oven and cut into equal portions.

The first example of an **Edible Portion (E.P.)** is when a chef has to order chicken breasts for a banquet of 300 guests. Each guest will receive one chicken breast weighing 8 ounces. The only preparation needed before the breast is cooked is for the chef to add his or her special ingredients or marinades. There is no waste in buying the product. The chef knows the exact cost, weight, and portion size of all 300 breasts when purchased.

The second example can be shown as follows: A chef purchases a short loin of beef. After fabricating the short loin, the loin is cut into steaks. The chef now has steaks that are in the state of **edible portion (E.P.).** They can be grilled and served to the guests.

When a chef roasts a prime rib of beef, a certain percentage of the weight of the product is lost through cooking (this is called **shrinkage**). After the roast is taken from the oven and rests the proper time, it is cut into desired portion weights and served to the guests in an **edible portion (E.P.).**

Therefore, the food service professional can purchase products **as purchased (A.P.)** and fabricate them to get them to their desired state of **edible portion (E.P.),** or buy products ready to cook or even, in some instances, ready to be served directly to the guests without any preparation.

It is critical that food service professionals know how to determine the **edible portion (E.P.)** of products, both for determining serving portions and figuring out the food cost of the product. Two key factors that must be considered in the **edible portion (E.P.)** are **shrinkage** and **yield.**

How to Determine the Number of Servings (Yield) To find out how many servings can be obtained from a given product (yield), the amount of the **edible portion (E.P.)** must first be established. Using our three examples from above, we will illustrate how to obtain the yield.

In the first example, the chef simply has to place an order for the 300 chicken breasts. The chef knows that the yield will result in 300 (8-oz.) chicken breasts.

For the second example, the restaurant purchases an 18-pound short loin of beef in the **as purchased (A.P.)** state. When the prep cook trims and bones the short loin the resulting waste of bone, fat, and skin cannot be used; in effect, they are lost to the restaurant. This loss amounts

to 2 pounds and 10 ounces. When the cook weighs the trimmed short loin, it now weighs 15 pounds and 6 ounces (18 pounds − 2 pounds and 10 ounces). The amount of short loin left is the **edible portion (E.P.)** before cooking. Once the cook knows the **edible portion (E.P.),** the amount of servings can be determined. The formula is as follows:

Edible portion (E.P.) divided by (÷) serving portion = number of servings.

Using our short loin from above, we will illustrate how to determine the number of servings that the prep cook will obtain.

Step 1: Convert the **as purchased (A.P.)** 18-pound short loin into ounces (16 ounces in a pound).

18 times (×) 16 = 288 ounces **as purchased (A.P.)**

Step 2: Convert the resulting waste from the short loin, 2 pounds and 10 ounces, into ounces.

2 times (×) 16 = 32 + 10 = 42 ounces of waste

Step 3: Subtract the waste (42 ounces) from the **as purchased (A.P.)** ounces (288)

288 minus − 42 = 246 ounces. This is now the **edible portion (E.P.).**

Step 4: The portion size of the steak is determined based upon restaurant specifications (12 ounces). This is the **edible portion (E.P.)** for one steak.

Step 5: The **edible portion (E.P.)** of the short loin (246 ounces) is divided by the portion size of one steak (12 ounces).

246 divided by (÷) 12 = 20.5 steaks

Therefore, 20 (12-ounce) steaks is the **yield** that results from this **E.P.,** which equals 240 ounces. This leaves 6 ounces from the short loin that cannot be used, because it is not the correct portion size.

Shown as long division:

```
      20.5
12)246.0      E.P. Amount
   24
     60
     60
```

Each steak is to weigh 12 ounces, so the weight of each steak is divided into 246 ounces **E.P.** amount. This shows that 20 steaks can be cut from the sirloin. It was necessary to convert the **E.P.** amount to ounces because you can only divide like amounts.

In the third example, the chef will roast a pork loin after it has been fabricated. The pork loin weighs 13 pounds. One pound and 2 ounces are lost through shrinkage. How many 8-ounce portions can be obtained after cooking?

Step 1: Convert the fabricated pork loin into ounces (16 ounces in a pound).

13 times (×) 16 = 208 ounces

Step 2: Convert the amount of shrinkage into ounces.

One pound = 16 ounces + 2 ounces = 18 ounces of shrinkage

Step 3: Subtract the shrinkage from the fabricated pork loin.

208 ounces minus (−) 18 ounces = 190 ounces

Step 4: The **edible portion (E.P.)** of the pork loin (190 ounces) is divided by the portion size (8 ounces).

190 divided by 8 (or 190 ÷ 8) = 23.75 portions

Therefore, 23 (8-oz). portions is the **yield** that results from this **E.P.,** which equals 184 ounces. This leaves 6 ounces from the pork loin that cannot be used, because it is not the correct portion size.

SUMMARY REVIEW 7–4

1. A 7-pound **A.P.** beef tenderloin is trimmed; 8 ounces are lost. How many 6-ounce filet mignons can be cut from the tenderloin?

   _____

2. How many 5-ounce pork chops can be cut from a pork loin weighing 15 pounds **A.P.** if the tenderloin, which is removed, weighed 9 ounces, and 3 pounds 5 ounces are lost through boning and trimming?

   _____

3. How many orders of meatballs can be obtained from 40 pounds **E.P.** of ground beef if each meatball is to weigh 2 ounces and two meatballs are served per order?

   _____

4. How many orders of Swedish meatballs can be obtained from 32 pounds **E.P.** of ground pork and veal if each meatball weighs $1\frac{1}{2}$ ounces and four meatballs are served with each order?

   _____

5. How many 5-ounce Swiss steaks can be cut from a beef round weighing 44 pounds **A.P.** if 4 pounds 3 ounces are lost in boning and trimming?

   _____

6. When preparing pork sausage, 16 pounds **A.P.** of pork picnic is purchased. One-fourth of the amount is lost through boning and trimming. How many 4-ounce patties can be obtained?

_____

7. How many 5-ounce glasses of orange juice can be obtained from 2 gallons of orange juice?

_____

8. Forty-six pounds **(A.P.)** of turkey breast are purchased. Four pounds 4 ounces are lost through boning and skinning. How many turkey steaks can be obtained if each steak is to weigh 5 ounces?

_____

9. A 13-pound **(A.P.)** pork loin is roasted. One pound 2 ounces are lost through waste. How many $2\frac{1}{2}$-ounce servings can be obtained from the cooked loin?

_____

10. A 14-pound **(A.P.)** ham is trimmed. Twelve ounces are lost. How many ham steaks can be cut from the ham if each steak is to weigh 6 ounces?

_____

11. A 19-pound **(A.P.)** rib eye is purchased. Two pounds 14 ounces are lost through trimming. How many rib steaks can be cut from the rib eye if each steak is to weigh 8 ounces?

_____

12. A 12-pound **(E.P.)** pork loin is purchased. How many $4\frac{1}{2}$-ounce pork cutlets can be cut from the loin?

_____

13. Eleven pounds of chicken croquette mixture is prepared. How many croquettes will the mixture produce if each croquette is to weigh $2\frac{1}{2}$ ounces?

_____

14. A 20-pound **(A.P.)** leg of veal is purchased. Six pounds 6 ounces are lost through trimming and boning. How many 5-ounce veal cutlets can be obtained from the leg of veal?

_____

15. How many $5\frac{1}{2}$-ounce hamburgers can be obtained from 45 pounds **(E.P.)** of ground chuck?

_____

ORDERING FOOD

Controlling amounts to order is another important food service function. Ordering close to the proper amount needed will reduce inventories and help control food cost and waste. When ordering food for a specific number of people, the amount to order can be found by multiplying the amount of the serving portion by the number of people to be served. The result will be the number of ounces required. Next, convert the common purchasing quantity into ounces and divide this amount into the number of ounces needed. (Of course, in the case of meat, fish, etc., consideration must be given to the amount that may be lost through boning and trimming.) A suggested formula is as follows:

Amount of portion × number of people served
= number of ounces required.
Common purchase quantity × 16
= number of ounces in pound
Number of ounces required ÷ ounces in pound
= number to order.

Example: How many pounds of ground chuck **E.P.** should be ordered if 42 people are to be served and each person is to receive a 5-ounce portion?

Step 1:
5 ounces × 42 = 210 ounces.
Amount of portion × number to be served
= number of ounces required to serve 42 people.

Step 2:
210 ounces ÷ 16 ounces = $13\frac{1}{8}$ = 14 pounds.
Number of ounces required ÷ 16 ounces in one pound
= amount to order.

This example can also be shown as follows:

42	Number of people to be served
× 5	Serving portion 5 ounces
210	Number of ounces to serve 42 people

$$\begin{array}{r} 13\frac{1}{8} \\ 16\overline{)210\text{ oz.}} \\ \underline{16} \\ 50 \\ \underline{48} \\ 2 \end{array}$$

14 pounds must be ordered

A total of 210 ounces will be required to serve 42 people. The common purchase quantity for meat is pounds. Since there are 16 ounces in a pound, 16 is divided into the number of ounces required. The result is 13 and $\frac{1}{8}$ remaining, so the actual number of pounds to be ordered must be 14 pounds. The remainder indicates that 13 pounds will not produce enough portions to serve 42 people.

SUMMARY REVIEW 7–5

1. For a wedding of 270 guests, an **E.P.** 8-oz. sirloin steak will be served. If each fabricated sirloin weighs 16 pounds, how many sirloins must be ordered?

_____

2. Salisbury steak is to be served to a party of 195 people. Each portion is to weigh 7 ounces. How many **E.P.** pounds of ground beef must be ordered?

_____

3. How many **E.P.** pounds of pork sausage should be ordered for 68 people if each person is to receive two $2\frac{1}{2}$-ounce patties?

_____

4. How many gallons of orange juice must be ordered for a party of 175 people if each person is to receive a 5-ounce glass?

_____

5. How many pounds of bacon should be ordered when serving a breakfast party of 96 people if each person is to receive 3 slices of bacon and there are 16 slices of bacon to each pound?

_____

6. When preparing a breakfast for 220 people, how many pounds of link sausage must be ordered if each person is to receive three sausages and there are eight sausages to each pound?

_____

7. How many **E.P.** pounds of short ribs should be ordered when preparing for 80 people if each person is to receive a 12-ounce portion?

_____

8. How many pounds of ground beef must be ordered to serve spaghetti and meatballs to 130 people if each person is to receive two $2\frac{1}{2}$-ounce meatballs.

_____

9. Pot roast of beef is being served to 110 people. Each person is to receive a 5-ounce serving. It is estimated that 3 pounds will be lost in shrinkage. How many **A.P.** pounds of beef brisket should be ordered?

_____

10. When preparing a breakfast for 138 people, how many pounds of Canadian bacon must be ordered if each person is to receive a $2\frac{1}{2}$-ounce portion?

_____

11. How many pounds of ground beef must be ordered when preparing meat loaf for 76 people if each person is to receive a $5\frac{1}{2}$-ounce serving?

_____

12. How many gallons of apple juice must be ordered to serve a party of 115 people if each person is to receive a 4-ounce glass of juice?

_____

13. How many **E.P.** pounds of pork loin must be ordered when serving 4-ounce breaded pork chops to a party of 210 people?

_____

14. How many **E.P.** pounds of spare ribs should be ordered when preparing for 65 people if each person is to receive a 12-ounce portion?

_____

15. How many **A.P.** pounds of beef tenderloin should be ordered to serve a party of 105 people if each person is served a 6-ounce tenderloin steak, and 1 pound 7 ounces are allowed for trimming?

_____

PURCHASING FRESH FISH

The quantity of fresh fish to purchase depends on three things: the number of people being served, the portion size, and the market form desired. Figure 7–10 is a suggested guide associating the market form to the amount to purchase.

The formula shown below will simplify the ordering procedure:

Amount per person × number served = amount to order.

Market Form	Amount per person
Fish sticks, steaks & fillets **(E.P.)**	$\frac{1}{3}$ pound
Dressed fish **(E.P.)**	$\frac{1}{2}$ pound
Drawn fish **(A.P.)**	$\frac{3}{4}$ pound
Whole fish or fish in the round (just as it comes from the water) **(A.P.)**	1 pound

Figure 7–10 *Chart for purchasing fresh fish*

Example One: How many pounds of fish steaks must be ordered for serving a party of 84 people? (Use guide.)

$$\frac{1}{3} \times \frac{84}{1} = 28 \text{ pounds}$$

Example Two: How many pounds of dressed fish should be ordered when preparing for a group of 72 people? (Use guide.)

$$\frac{1}{2} \times \frac{72}{1} = 36 \text{ pounds}$$

Example Three: How many pounds of drawn fish should be ordered when preparing for a party of 56 people? (Use guide.)

$$\frac{3}{4} \times \frac{56}{1} = 42 \text{ pounds}$$

SUMMARY REVIEW 7–6

Determine the answers to the following 10 questions using the information from Figure 7–10.

1. How many pounds of drawn fish should be ordered when preparing for a party of 88 people?

   _____

2. How many pounds of fish steaks should be ordered when preparing for a group of 78 people?

   _____

3. How many pounds of fish fillets should be ordered when preparing for a party of 75 people?

   _____

4. How many pounds of fish sticks should be purchased when preparing for a group of 96 people?

   _____

5. How many pounds of drawn fish should be purchased when preparing for a party of 140 people?

_____

6. How many pounds of dressed fish should be purchased when preparing for a party of 94 people?

_____

7. How many pounds of fish steaks should be ordered when preparing for a group of 135 people?

_____

8. How many pounds of fish fillets should be ordered when preparing for a party of 114 people?

_____

9. How many pounds of fish sticks should be purchased when preparing for a group of 123 people?

_____

10. How many pounds of drawn fish should be ordered when preparing for a party of 168 people?

_____

YIELD PERCENTAGE OF AN A.P. PRODUCT

Once it has been determined how much of an **A.P.** product is waste and how much is **E.P.,** the person ordering food can convert this to a yield percentage. The purchaser can keep records of the yield percentage of items used and will know how much to purchase for future orders. As an example, we will use the information from our 18-pound short loin of beef in the **as purchased (A.P.)** state. We discovered that, when the prep cook trimmed and boned the short loin, the resulting loss in waste amounted to 2 pounds and 10 ounces. The remaining trimmed short loin weighs 15 pounds and 6 ounces (18 pounds − 2 pounds and 10 ounces). The yield percentage of the short loin is determined in this manner:

Edible portion (E.P.) divided by (÷) as purchased (A.P.) = yield percentage.

Using our short loin from above, we will illustrate how to determine the yield percentage.

Step 1: Convert the **as purchased (A.P.)** 18-pound short loin into ounces (16 ounces in a pound).

18 times (×) 16 = 288 ounces **as purchased (A.P.)**

Step 2: Convert the resulting waste from the short loin, 2 pounds and 10 ounces, into ounces.

2 times (×) 16 = 32 + 10 = 42 ounces of waste

Step 3: Subtract the waste (42 ounces) from the **as purchased (A.P.)** ounces (288)

288 minus (−) 42 = 246 ounces. This is now the **edible portion (E.P.)**

Step 4: Divide the **E.P.** by the **A.P.** to equal the yield percentage.

246 ÷ 288 = 85.4% **yield percentage**

How to Use the Yield Percentage

Once the purchaser knows how to determine the yield percentage of products, each product should be tested for the yield percentage. When the yield percentage is determined, this number must be saved for future ordering. The individual purchasing the product will have to take the yield percentage into account when purchasing products.

To figure out the amount of food to order, we will continue with our short loin example from above. For instance, your chef tells you to order enough short loin to serve each of 100 guests an 8-oz. portion. The purchaser has determined, through previous experiences, that a short loin results in a yield percentage of 85.4%. This can be solved by figuring out the amount of **edible portion (E.P.)** that is needed, and then dividing it by the **yield percentage.**

Step 1: Determine the amount of **E.P.** of short loin needed for the 100 guests.

100 guests × 8 oz. portion = 800 ounces of **E.P.** needed

Step 2: Number of ounces needed by **E.P.** divided by (÷) yield percentage = number of ounces of short loin needed.

800 ounces ÷ 85.4% = 936.76814 ounces of short loin needed

Step 3: Convert the ounces into pounds by dividing the amount of ounces needed by 16.

936.76814 ÷ 16 = 58.548008 pounds

Step 4: The purchaser would order 59 pounds of short loin.

Based on the authors' research, most purchasers and chefs determine the yield percentage one time and then they order based on experience. For example, one chef told us that for every prime rib he roasts, he obtains 17 regular cuts and 20 English cuts from the size of the rib he specifies. When he has a party for 200 guests, he divides the 200 by 17 and determines that he must order 12 prime ribs. Another purchasing agent told us that he knows, when a romaine salad is on the menu, that the cooks obtain 100 portions from the purchased case of romaine that he buys. Therefore, if he projects to serve 300 romaine salads, he orders three cases of romaine lettuce.

SUMMARY REVIEW 7–7 Yield Percentage

Answers should be shown in this manner: 98.1%.

1. What is the yield percentage of a 24-pound turkey? The turkey lost 8 pounds and 5 ounces after fabrication and shrinkage.

   _____

2. What is the yield percentage of an 8-pound pork tenderloin? The tenderloin lost 1 pound and 5 ounces after fabrication and shrinkage.

   _____

3. What is the yield percentage of 50 pounds of potatoes? The potatoes lost 6 pounds and 3 ounces after fabrication.

   _____

4. What is the yield percentage of a 15-pound salmon? The salmon lost 3 pounds and 9 ounces after fabrication and shrinkage.

   _____

5. What is the yield percentage of a 7-pound chicken? The chicken lost 4 pounds and 2 ounces after fabrication and shrinkage.

   _____

Questions 6 through 10 have to be solved using the yield percentage for ordering food.

6. If the yield percentage for a prime rib roast is 50%, how many pounds will have to be ordered to serve 300 guests? Each guest will receive an 8-ounce portion.

   _____

7. If the yield percentage for a chicken breast is 29.6%, how many pounds will have to be ordered to serve 250 guests? Each guest will receive a 6-ounce portion.

   _____

8. If the yield percentage for salmon is 45%, how many pounds will have to be ordered to serve 150 guests? Each guest will receive a 7-ounce portion.

   _____

9. If the yield percentage for a cantaloupe melon is 58.1%, how many pounds will have to be ordered to serve 75 guests? Each guest will receive a 4-ounce portion.

_____

10. If the yield percentage for strawberries is 91.9%, how many pounds will have to be ordered to serve 300 guests? Each guest will receive a 3-ounce portion.

_____

DISCUSSION QUESTION 7–A

Your produce salesman offers to sell you bags of salad ingredients (cleaned and ready to eat). You have been buying the ingredients individually, and cleaning and preparing them with your current workforce. What considerations will you take into account when determining whether you should purchase ready-to-serve salad ingredients versus ones that your staff will have to clean and prepare? Provide three considerations.