

# PART II: ALL ABOUT RICE – SCIENCE, TYPES & NUTRITION

## OBJECTIVES

After completing this section students will be able to:

- Understand the different forms of rice by degree of milling and rice co-products
- Outline the three classifications of rice by size; explain differences between short, medium and long grain rice
- Explain the role starch plays in cooked rice
- Explain the differences between regular-milled, parboiled and precooked rice
- Identify the benefits of rice in foodservice
- Understand basic rice nutrition

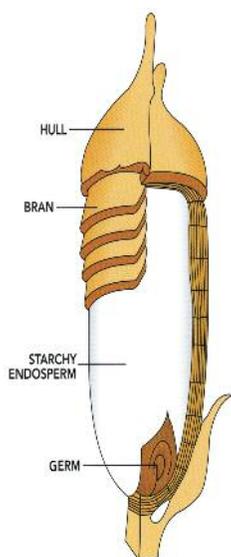
## LESSON PLAN

Topic	Suggested Activity	Suggested Time
Rice Classification	Lecture/Discussion	30 min
Degree of Milling	Demonstration/Exhibit and taste different rices	20 min
Kernel Size		
Starch Content		
Flavor		
Top 10 Benefits	Lecture/Discussion	5 min
Forms of Rice	Lecture/Discussion	15 min
	Demonstration/Exhibit different rices	10 min
Rice Nutrition	Lecture	10 min

## RICE CLASSIFICATION

Rice can be categorized in four ways:

- Degree of Milling
- Kernel Size
- Starch Content
- Flavor



# PART II: ALL ABOUT RICE – SCIENCE, TYPES & NUTRITION

## Degree of Milling

(See Milling Process on page 5 Rice Processing Flow Chart in Additional Resources)

Rice classified by degrees of milling:

1. Paddy Rice or Rough is completely unprocessed. Because it includes the hard fibrous hull, paddy rice is indigestible and is not used for human consumption.
2. Whole Grain (Brown) Rice has the hull removed, leaving the bran layer intact. It is 100 percent whole grain, containing the bran, endosperm and germ.
3. White Rice is the endosperm of the kernel with the hull, bran and germ removed.



Some Rice Co-Products:

- **Rice Flour**—Broken kernels of rice (white or whole grain) are separated from whole kernels during milling and are ground into rice flour, also called rice meal. Because rice flour does not absorb water as readily as wheat flour, it makes crispier coatings for baked and fried foods. It is also used for dusting the surface of doughs. Rice does not contain gluten, so rice flour is often the preferred choice for creating products for consumers who are gluten-intolerant.
- **Rice Bran**—Rice bran removed during milling contains dietary fiber and antioxidant-rich phytochemicals that have been found to help reduce the risk of heart disease, certain cancers and type II diabetes.
- **Rice Bran Oil**—Oil extracted from rice bran has unique nutritional and culinary properties. It has a nut-like flavor, good shelf stability and is favored by some chefs for applications such as frying. Studies show that antioxidants in rice bran oil may be effective in reducing serum cholesterol levels.
- **Rice Syrup**—Mild flavored sweet syrup from rice (with range of concentrations and sweetness levels) can be substituted for sugar, honey, corn syrup, molasses or maple syrup in recipes.

## Kernel Size

There are more than 120,000 different strains of rice worldwide. All of these, however, can be grouped into three basic categories, according to their size:



## RICE FACTS

- Starch makes up most of a rice kernel (regardless of variety or degree of processing).
- Protein is the second greatest portion of a rice grain.
- All types of rice contain essential vitamins and minerals.
- Whole grain brown rice has bran and germ intact.

# PART II: ALL ABOUT RICE – SCIENCE, TYPES & NUTRITION

## Rice Kernel Size Comparison

Kernel Size	Rice Grain Dimensions	Examples	Cooked Rice Description	Usage Examples
Long rain 	3 to 4 times as long as it is wide	<ul style="list-style-type: none"> <li>• Long grain brown or white</li> <li>• Della</li> <li>• U.S. basmati</li> <li>• U.S. aromatic red</li> <li>• U.S. jasmine</li> </ul>	Fluffy separate grains  While classified as long grain, jasmine rice’s characteristics resemble medium grain’s moist, clingy texture	Entrées, Soups, Salads, Pilafs, Side Dishes, Rice Bowls, Fried Rice
Medium rain 	2 to 3 times as long as it is wide	<ul style="list-style-type: none"> <li>• Medium grain brown or white</li> <li>• Calrose</li> <li>• Premium medium grain</li> <li>• U.S. arborio</li> <li>• Black japonica</li> <li>• Mahogany japonica</li> </ul>	Moist and slightly sticky	Sushi, Asian Dishes, Risotto, Paella, Soups, Salads, Rice Pudding
Short rain 	Short and almost round	<ul style="list-style-type: none"> <li>• Short grain brown or white</li> <li>• Koshihikari</li> <li>• Calmochi</li> <li>• Akitakomachi</li> </ul>	Soft, moist, sticky	Sushi, Risotto, Asian Entrées and Desserts, Rice Pudding

### Starch Content

Rice is composed of two different types of starch molecules: amylose and amylopectin. The amounts of these two starches determine the texture of rice when it is cooked.

Rice with higher amylose content, such as long grain rice, is firmer and fluffier. Rice with lower amylose content, such as short and medium grain rice, has a softer, stickier texture.

### FAST FACT

In general, the longer the rice grain, the more amylose starch it contains.

### The Effect of Starch on Rice Cooking:

- Dishes such as risotto and sushi rely on rice that is low in amylose to create their characteristic soft and sticky textures.
- Rice dishes that have fluffy separate grains, like rice pilaf, are best made with rice that is higher in amylose starch.
- Some sticky rice dishes, like many Asian desserts, are made from varieties of rice that contain no amylose starch. These varieties of rice are called sweet, waxy or glutinous rice.

# PART II: ALL ABOUT RICE – SCIENCE, TYPES & NUTRITION

## Flavor

Many types of white rice are prized for their mild neutral flavor profile, making them ideal on their own or as a flavor carrier for more richly seasoned dishes. Whole grain brown rice has a rich, nutty flavor suitable for a wide range of recipes.

Some rices are known for their distinctive flavor and exotic aromas. “Aromatic” varieties are often used in ethnic dishes and are a popular choice for chefs and customers. These include:

Aromatic Rice Type	Appearance	Flavor Description
U.S. jasmine	Long medium-thick grains	Popcorn, subtle floral
U.S. basmati	Long slender grains	Popcorn, toasted nuts
U.S. black and mahogany japonica	Medium-long grains, purple-black or dark brown color	Subtle sweet spiciness
U.S. aromatic red	Medium-long grains, mahogany-honey-red color	Sweet nuttiness

## WHAT GIVES RICE ITS FLAVOR?

The protein, vitamins, minerals and trace amount of oil in the outer layers of rice grains are thought to create the fragrant notes of brown rice—for example nutty, vanilla and maple flavors. White rice can have subtle floral, hay-like, nutty and popcorn flavors that are particularly pronounced in aromatic varieties of rice. Aromatic varieties of rice are available as either whole grain or white rice.

## Top 10 Benefits of Rice in Foodservice:

1. **Global**—Rice is popular and an essential ingredient in both traditional American and ethnic cuisines for today’s menus—Cajun/Creole, Southwest, Mexican, Italian, Thai, Indian, Japanese, Chinese, Vietnamese, Spanish, Middle Eastern and more.
2. **Versatile**—Rice’s versatility lends itself to dishes for every daypart—breakfast, lunch, dinner and dessert. Rice provides a wide selection of different types to choose from, suited to any dish being offered.
3. **Flavor Carrier**—Rice’s mild, neutral flavor and satisfying texture provide an ideal carrier for ingredients and seasonings.
4. **Nutritious**—Rice is nutritious and helps provide healthy meals customers seek. Rice combines well with other healthy foods.
5. **Low Cost/Profitable**—Rice is a low-cost ingredient that provides great plate coverage. At **less than 10 cents per serving**, rice can help offset the cost of more expensive proteins on the plate. Rice also revitalizes leftovers. Vegetables and cooked proteins that might otherwise go unused can combine with rice in tasty stir fries, rice bowls, fried rice, pilafs and more.
6. **Easy to Prepare**—Rice can be prepared quickly and effectively in any operation. Low labor cost means higher profits.
7. **Non-Perishable**—Dry rice stores well without requiring valuable refrigeration or freezer space.
8. **Travels Well**—Cooked rice holds well, travels well and reheats perfectly, making it ideal for take-out items.
9. **Multiple Types**—Rice comes in multiple forms—regular-milled, parboiled, precooked (instant), IQF (individually quick frozen), RTS (ready-to-serve), and pre-seasoned mixes that fit a wide variety of foodservice uses.
10. **Convenient**—Rice is available in blends and seasoned mixes. Rice sold with pre-seasoning packets offer convenience and consistency to the operator.

# PART II: ALL ABOUT RICE – SCIENCE, TYPES & NUTRITION

## Forms of Milled Rice by Processing:

- **Regular-Milled Rice**—Rice that undergoes traditional milling without parboiling or precooking.
- **Parboiled Rice**—Parboiled rice is paddy or rough rice that has been steamed under pressure, dried and milled (see Parboiled Rice below).
- **Precooked (Instant) Rice**—Precooked rice has been completely cooked and dried or dehydrated. As a result, precooked rice only requires rehydration or brief cooking before serving.
- **Individually Quick Frozen (IQF) Rice**—Cooked rice grains are individually frozen before packaging to provide a free-flowing ingredient for use in frozen and prepared food products and for ease of use in foodservice operations.
- **Ready-to-Serve**—Fully cooked rice that is packaged in pouches or cup containers and is ready to eat after brief heating.
- **Seasoned Rice Mixes**—Regular milled, parboiled or precooked rice containing pre-measured seasonings for ease of preparing a variety of flavored finished products, such as Spanish rice, wild rice pilaf, yellow rice, southwest-style rice, Asian-style rice and more. Custom mixes are also available through some rice suppliers.

## What is Parboiled Rice?

*Parboiled* is short for partially boiled (not precooked). It is a practice thought to be more than 2,000 years old, having originated in the Persian Gulf and subcontinent of India. Today, parboiled rice is readily available and is a popular choice in foodservice.

- Parboiled rice begins with paddy rice that is pressure-steamed before it is milled to make parboiled whole grain brown or white rice.
- Not to be confused with precooked (instant) rice that doesn't require cooking, parboiled rice needs to be fully cooked before it is served.
- The parboiling process partially cooks or "pre-gelatinizes" the starch in the rice. This results in cooked rice where the grains are firm, fluffy and separate. Cooked, parboiled rice holds well on steamtables for longer periods of time.
- During the heat treatment of parboiled rice, the grain develops a pale yellow color. This color change is thought by scientists to result from the transfer of colored pigments in the bran into the endosperm.
- By pressure steaming the entire kernel, some of the nutrients in the bran layers are driven into the endosperm.

## GLUTINOUS: DON'T BE CONFUSED!

- glutinous rice is another name for rice that does not have amylose starch and is therefore very soft and sticky.
- glutinous (with an "i") rice does not contain gluten (with an "e").
- gluten is a protein found in grains like wheat, barley and rye.
- gluten from wheat and other grains causes sensitivity to those who have gluten intolerance or Celiac disease, a digestive disorder in which sufferers are not able to digest gluten.
- **RICE IS NATURALLY GLUTEN-FREE.**



## PART II: ALL ABOUT RICE – SCIENCE, TYPES & NUTRITION

### Rice Makes Good Nutrition and Business Sense

Rice is a naturally nutritious grain, and the foundation for healthier eating for all dietary patterns and lifestyles. Research shows that consumers who eat rice have diets closer to the recommended U.S. Dietary guidelines for Americans.

The U.S. Dietary guidelines recommend that consumers eat more nutrient-dense foods, meaning those that deliver ample vitamins and minerals with relatively low amounts of calories. The guidelines also recommend that carbohydrates such as rice make up 45-65 percent of the daily diet, and suggest an average of five servings (more or less depending on calorie needs) of grains each day, with whole grains making up at least half of grain servings.

In foodservice, rice is unsurpassed for its culinary versatility and is the perfect partner on the plate with other healthy foods, including vegetables, lean proteins, beans and soy foods. Rice can be enjoyed by individuals of all ages and can help meet a broad range of nutrition goals.

Today's consumers are looking for healthy meal options both at home and away from home. Providing natural, wholesome foods is a smart strategy for chefs and operators to meet customers' needs. Plus, serving whole grain and enriched rice dishes is a great way to satisfy customers while keeping food costs in check.

### Here's what makes rice naturally nutritious. Rice:

- Is sodium- and cholesterol-free.
- Has only a trace of fat, no cholesterol-raising trans fats or saturated fat.
- Is gluten-free and the least allergenic of all grains.
- Is nutrient dense and contributes over 15 vitamins and minerals, including folic acid and other B-vitamins, iron and zinc.
- Has approximately 100 calories per half-cup serving.
- Is comprised of complex carbohydrates that are more slowly digested.
- Triggers the neurotransmitter serotonin in the brain that helps regulate and improve mood.
- Is an energy food, supplying carbohydrates that fuel the body's physical activity.



### Rice Offers Good Nutrition and Top Value for the Food Dollar

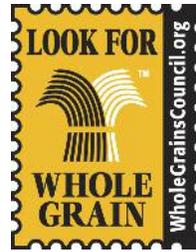
A half-cup cooked serving of white or brown rice costs less than 10 cents, and provides vitamins, minerals and nutrients. One pound of uncooked rice makes over two pounds of cooked rice. High satisfaction and good nutrition make rice an essential ingredient in foodservice, where customer satisfaction and operational profitability are critical to success.

## PART II: ALL ABOUT RICE – SCIENCE, TYPES & NUTRITION

### Whole Grain Stamp

The Whole Grains Council (WGC) is a non-profit consumer advocacy group working to increase consumption of whole grains for better health. Among WGC's initiatives are programs designed for chefs and operators to promote whole grain menu options in foodservice.

The Whole Grain Stamp on packages of brown rice makes it easy for chefs, operators and consumers to know they are purchasing authentic whole grain foods. Products marked with the stamp offer at least a half serving of whole grains. Each Stamp shows the number of grams of whole grain ingredients in a serving of the product. There are two different versions of the Whole Grain Stamp, the 100% Stamp and the Basic Stamp.



- If a product bears the 100% Stamp, then all its grain ingredients are whole grains. There is a minimum requirement of 16g, a full serving of whole grain per labeled serving, for products using the 100% Stamp.
- If a product bears the Basic Stamp, it contains at least 8g, a half serving of whole grain, but may also contain some refined grain.
- **WHOLE GRAIN BROWN RICE BEARS THE 100% WHOLE GRAIN STAMP.**

For more information, visit the Whole Grains Council website at [www.wholegrainscouncil.org](http://www.wholegrainscouncil.org).

### Rice is Gluten-Free

Rice is the least allergenic of all grains. The National Institutes of Health revealed that Celiac disease (gluten intolerance) affects three million Americans, with millions more suffering from gluten sensitivity. Celiac disease is a digestive disorder in which sufferers are unable to digest gluten, the protein found in grains including wheat, barley and rye.

Among Celiacs, this protein interferes with the absorption of nutrients and may cause up to 20 different symptoms, including gas, chronic diarrhea, weight loss, anemia and fatigue. The cornerstone of treatment for individuals with Celiac disease is to follow a life-long gluten-free diet. Enriched white rice and whole grain brown rice are important staples in these diets, providing all the benefits of other grains without the gluten.

With greater consumer awareness of gluten sensitivity today, foodservice operations will benefit by offering customers gluten-free meal options. Staff training on menu items that do not contain gluten is an important step in helping patrons select dishes that fit their gluten-free diets.

For more information on gluten-free foods and cooking, visit the Celiac Sprue Association website at [www.csaceliacs.org](http://www.csaceliacs.org).



## PART II: ALL ABOUT RICE – SCIENCE, TYPES & NUTRITION

Visit [www.MenuRice.com](http://www.MenuRice.com) for more information on all of these topics.

### REVIEW/QUIZ QUESTIONS

1. Which of the two starch components in rice is associated with firmer cooked rice texture?
2. Which types of rice (long, medium or short grain) produce softer, stickier cooked rice?
3. Why is paddy rice inedible by humans?
4. Why does brown rice have more fiber than white rice?
5. *True or False:* Basmati and jasmine are two types of aromatic rice grown in the United States.
6. Name seven of the benefits of using rice in foodservice.
7. Explain the differences in preparation needs for parboiled versus precooked rice.
8. Name 5 nutrition benefits of rice.
9. Describe two reasons why rice is an ideal grain for people with Celiac Disease (gluten intolerance) or gluten sensitivity?
10. Describe one reason why enriched white rice should not be rinsed before or after cooking?



## PART II: ALL ABOUT RICE – SCIENCE, TYPES & NUTRITION

### REVIEW/QUIZ ANSWERS

1. Amylose
2. Medium and short grain rice
3. The hull is indigestible.
4. Brown rice contains the rice bran, which has fiber.
5. True
6. Essential for global cuisines, versatile, flavor carrier, nutritious, low cost (less than 10 cents/serving), easy to prepare, non-perishable, holds and travels well, many varieties, convenient (see Top 10 Benefits page 11).
7. They result from two different processes and require different preparation. Parboiled, rice like regular-milled rice, needs to be fully cooked before serving. Precooked (instant) rice only needs to be rehydrated or cooked for a short time.
8. Low in calories, sodium- and cholesterol-free, no cholesterol-raising trans fats or saturated fat, gluten-free (the least allergenic of all grains), nutrient dense and contributes over 15 vitamins and minerals, comprised of complex carbohydrates that are more slowly digested, triggers the neurotransmitter serotonin in the brain that helps regulate and improve mood, is an energy food supplying carbohydrates that fuel the body's physical activity.
9. Rice does not contain gluten and is the least allergenic of all grains.
10. Rinsing enriched rice washes off the enrichment coating and reduces its nutritional value.

