

Chapter 13

Rice Grades

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The United States Department of Agriculture (USDA) has established rice grades as U.S. No. 1 through 6, in which sample grade is based on quality discount factors. These factors include weed seed, red rice, seed mixture, damaged kernels,

chalky kernels, etc. Grades and grade requirements for rough rice and milled rice and presented in Tables 13-1 and 13-2, respectively. Price discounts for milled rice in Table 13-3 are a general guide. These tables indicate the importance of producing clean, nondamaged rice.

Table 13-1. Grades and grade requirements for the classes of rough rice, USDA, 2009.

Grade	Maximum limits of ----							Color requirements
	Seeds and heat-damaged kernels			Red rice and damaged kernels (singly or combined)	Chalky kernels			
	Total (singly or combined)	Heat-damaged kernels and objectionable seeds	Heat-damaged kernels		In long-grain rice	In medium- or short-grain rice	Other types†	
	Number in 500 grams	Number in 500 grams	Number in 500 grams	Percent	Percent	Percent	Percent	
U.S. No. 1	4	3	1	0.5	1.0	2.0	1.0	Shall be white or creamy.
U.S. No. 2	7	5	2	1.5	2.0	4.0	2.0	May be slightly gray.
U.S. No. 3	10	8	5	2.5	4.0	6.0	3.0	May be light gray.
U.S. No. 4	27	22	15	4.0	6.0	8.0	5.0	May be gray or slightly rosy.
U.S. No. 5	37	32	25	6.0	10.0	10.0	10.0	May be dark gray or rosy.
U.S. No. 6	75	75	75	15.0‡	15.0	15.0	10.0	May be dark gray or rosy.

U.S. Sample grade shall be rough rice which:
 a. does not meet the requirements for any of the grades from U.S. No. 1 to U.S. No. 6 inclusive;
 b. contains more than 14.0 percent of moisture;
 c. is musty, or sour, or heating;
 d. has any commercially objectionable foreign odor; or
 e. is otherwise of distinctly low quality.

† These limits do not apply to the class Mixed Rough Rice.
 ‡ Rice in grade U.S. No. 6 shall contain not more than 6.0 percent of damaged kernels.

Source: United States Department of Agriculture Federal Grain Inspection Service, *United States Standards for Rough Rice*.

Table 13-2. Grades and grade requirements for the classes of long-grain milled rice, medium-grain milled rice, short-grain milled rice, and mixed milled rice, USDA, 2009.

Grade	Maximum limits of ----											Color requirements	Minimum milling requirements
	Seeds and heat-damaged kernels (singly or combined)		Red rice and damaged kernels (singly or combined)	Chalky kernels		Broken kernels				Other types [‡]			
	Total	Heat-damaged kernels and objectionable seeds		In long-grain rice	In medium- or short-grain rice	Total	Removed by a 5 plate [†]	Removed by a 6 plate [†]	Through a 6 sieve [†]	Whole kernels	Whole and broken kernels		
U.S. No. 1	2	1	0.5	1.0	2.0	4.0	0.04	0.1	0.1	--	1.0	Shall be white or creamy.	Well milled.
U.S. No. 2	4	2	1.5	2.0	4.0	7.0	0.06	0.2	0.2	--	2.0	May be slightly gray.	Well milled.
U.S. No. 3	7	5	2.5	4.0	6.0	15.0	0.1	0.8	0.5	--	3.0	May be light gray.	Reasonably well milled.
U.S. No. 4	20	15	4.0	6.0	8.0	25.0	0.4	1.0	0.7	--	5.0	May be gray or slightly rosy.	Reasonably well milled.
U.S. No. 5	30	25	6.0	10.0	10.0	35.0	0.7	3.0	1.0	10.0	--	May be dark gray or rosy.	Reasonably well milled.
U.S. No. 6	75	75	15.0 ^{††}	15.0	15.0	50.0	1.0	4.0	2.0	10.0	--	May be dark gray or rosy.	Reasonably well milled.

U.S. Sample grade shall be milled rice of any of these classes which:

- does not meet the requirements for any of the grades from U.S. No. 1 to U.S. No. 6, inclusive;
- contains more than 15.0 percent of moisture;
- is musty or sour, or heating;
- has any commercially objectionable foreign odor;
- contains more than 0.1 percent of foreign material;
- contains two or more live or dead weevils or other insects, insect webbing or insect refuse; or
- is otherwise of distinctly low quality.

[†] Plates should be used for southern production rice; and sieves should be used for western production rice, but any device or method which gives equivalent results may be used.

[‡] These limits do not apply to the class Mixed Milled Rice.

^{††} Grade U.S. No. 6 shall contain not more than 6.0 percent of damaged kernels.

Source: United States Department of Agriculture Federal Grain Inspection Service, *United States Standards for Milled Rice*.

Factors Affecting Rice Grade

Grain Moisture Content

Rice milling yield may be lower if rice is harvested either at very high or low moisture contents. At high moisture contents, many kernels can still be thin and immature and often break during the milling process. The ends of wet rice kernels grind off and become dust when they are processed. Rice may fissure if it dries to below 15 percent moisture content and is rapidly

rewetted (e.g., rainfall, heavy dew). Rapid rewetting is a key cause for lowered head rice yields. Certain cultivars may be more susceptible to head rice yield reductions than others if rice drops below 15 moisture and is rewetted in the field.

Plant no more rice acreage of one maturity range than you have harvest capacity. The best way to extend combine capacity is by planting cultivars with different maturities. Planting over a longer period helps somewhat to spread rice maturity across more days in

Table 13-3. Price discount estimates for USDA grades of milled rice.

Grade	Discount (\$/bushel)
1	--
2	0.05
3	0.15
4	0.30
5	0.45
6	0.80
Sample	1.25

the fall and provides a more flexible harvest window. Refer to Chapter 15, Production Factors Impacting Rice Milling Yield, for more information on the impact of harvest moisture content on milling yields.

Head Rice and Milling Yields

Head rice yield is the weight percentage of rough rice that remains as “whole rice” (three-fourths kernel or greater) after complete milling. Environmental conditions, such as drought, high nighttime temperatures, low sunlight intensity, disease, inadequate or excessive nitrogen and draining water early in hot weather, all intensify stress on rice kernels. The susceptibility of kernels to develop chalk or other kernel-weakening features in response to stress differs somewhat among cultivars.

Milled rice yield is the weight percentage of rough rice that remains as milled rice (i.e., the sum of head rice and “broken” after milling). The value of broken fractions varies with market demand, but Table 13-4 illustrates that high milling yield and low foreign material content may provide considerably more income per acre. Refer to Chapter 15, Production

Factors Impacting Rice Milling Yield, for more information on milling yields.

Foreign Matter

Foreign matter or trash (i.e., blank kernels, stems, weed seed) often contains more moisture than grain. Presence of this material can affect rice price and, ultimately, net profit (Table 13-4). Milling yield is lowered by the amount of foreign material in the rough rice sample. Foreign material contributes to heating on trucks, blocks air flow in grain storage bins and increases the time and energy required for drying. Consider cleaning rice that has high foreign matter content. Another alternative is marketing rice with high foreign material content separate from cleaner rice to maximize income.

Table 13-4. Example of foreign material and low milling yield effects on rice price and net profit.

Description	Sample 1	Sample 2	Sample 3
Sample weight, grams	162	162	162
Foreign material, grams	0	0	10
Head rice weight, grams	89	94	88
Broken weight, grams	24	19	18
Milling yield percentage	55/70	58/70	54/65
Value per hundredweight†	\$6.48	\$6.60	\$6.13
Difference in price/cwt	--	+\$0.12	-\$0.35
Value at 150 bu/A	\$437.84	\$445.95	\$414.19
Value difference at 150 bu/A	--	+\$8.11	-\$23.65
Value at 200 bu/A	\$583.78	\$594.59	\$552.25
Value difference at 200 bu/A	--	+\$10.81	-\$42.34

†Prices based on long-grain value of \$10.13/cwt for head rice and \$6.03/cwt for broken.