

# Industry & Trade Summary

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**Milled Grains, Malts,  
and Starches**

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U.S. International Trade Commission  
Washington, DC 20436**



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# PREFACE

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In 1991 the United States International Trade Commission initiated its current *Industry and Trade Summary* series of informational reports on the thousands of products imported into and exported from the United States. Each summary addresses a different commodity/industry area and contains information on product uses, U.S. and foreign producers, and customs treatment. Also included is an analysis of the basic factors affecting trends in consumption, production, and trade of the commodity, as well as an analysis of those factors bearing on the competitiveness of U.S. industries in domestic and foreign markets.<sup>1</sup>

This report on milled grains, malts, and starches covers the period 1992 through 1996. Listed below are the individual summary reports published to date on the agriculture and forest products sector.

<i>USITC publication number</i>	<i>Publication date</i>	<i>Title</i>
2459	November 1991 . . . . .	Live Sheep and Meat of Sheep
2462	November 1991 . . . . .	Cigarettes
2477	January 1992 . . . . .	Dairy Produce
2478	January 1992 . . . . .	Oilseeds
2511	March 1992 . . . . .	Live Swine and Fresh, Chilled, or Frozen Pork
2520	June 1992 . . . . .	Poultry
2544	August 1992 . . . . .	Fresh or Frozen Fish
2545	November 1992 . . . . .	Natural Sweeteners
2551	November 1992 . . . . .	Newsprint
2612	March 1993 . . . . .	Wood Pulp and Waste Paper
2615	March 1993 . . . . .	Citrus Fruit
2625	April 1993 . . . . .	Live Cattle and Fresh, Chilled, or Frozen Beef and Veal
2631	May 1993 . . . . .	Animal and Vegetable Fats and Oils
2635	June 1993 . . . . .	Cocoa, Chocolate, and Confectionery
2636	May 1993 . . . . .	Olives
2639	June 1993 . . . . .	Wine and Certain Fermented Beverages
2693	October 1993 . . . . .	Printing and Writing Paper
2702	November 1993 . . . . .	Fur Goods
2726	January 1994 . . . . .	Furskins
2737	March 1994 . . . . .	Cut Flowers
2749	March 1994 . . . . .	Paper Boxes and Bags
2762	April 1994 . . . . .	Coffee and Tea

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<sup>1</sup> The information and analysis provided in this report are for the purpose of this report only. Nothing in this report should be construed to indicate how the Commission would find in an investigation conducted under statutory authority covering the same or similar subject matter.

# PREFACE-Continued

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<i>USITC publication number</i>	<i>Publication date</i>	<i>Title</i>
2859	May 1995 .....	Seeds
2865	April 1995 .....	Malt Beverages
2875	May 1995 .....	Certain Fresh Deciduous Fruits
2898	June 1995 .....	Certain Miscellaneous Vegetable Substances and Products
2917	October 1995 .....	Lumber, Flooring, and Siding
2918	August 1995 .....	Printed Matter
2928	November 1995 .....	Processed Vegetables
3022	April 1997 .....	Industrial Papers and Paperboards
3080	February 1998 .....	Canned Fish, except Shellfish
3083	February 1998 .....	Dairy Products
3095	March 1998 .....	Milled Grains, Malts, and Starches

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# ABSTRACT

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This report addresses trade and industry conditions for milled grain products, malts, and starches for the period 1992-96.

- The United States is one of the leading world grain producers and has a large grain milling industry, based on abundant U.S. supplies of wheat, corn, barley, and oats, the leading grains milled. Wheat, the leading product, is milled into flour and further processed to make foods; smaller amounts go into starch, gluten, and some industrial products. The U.S. corn milling industry chiefly produces starch, corn sweeteners, and feedstuffs and, secondarily, corn meal and flour. Barley goes mainly to make malt used in beer, while milled oats are used in breakfast cereals and other foods.
- Producers of these milled grain, malt, and starch products in the United States had annual shipments exceeding \$9 billion during 1992-96, with employment of over 27,000 persons. Domestic wheat millers significantly increased their processing capacity to meet the rising demand for milled wheat products in this period.
- U.S. imports doubled during the period to \$175 million, mostly because of higher imports from Canada. Imports comprised less than 1 percent of U.S. consumption of these products, with over half of these coming from Canada and lesser amounts from Thailand and the European Union.
- Foreign markets for U.S. milled wheat and starches purchased about 5 percent of U.S. production annually during the period. The United States has traditionally been the second or third leading world exporter of wheat flour. The top four markets for the \$425 million of U.S. exports in 1996 were Mexico, Canada, Haiti, and Japan. U.S. wheat flour exports fell sharply in 1996 as U.S. Government export assistance declined and as competitive exporters, mainly the European Union, Turkey, and emerging Eastern European countries, displaced U.S. sales.
- The U.S. general duties on products covered in this report averaged about 1 percent ad valorem in 1996, with 30 percent entering free of duty. Canadian products have benefitted from NAFTA, which provided duty-free entry to the U.S. market for most milled grain, malt, and starches from Canada.
- The food and beverage industries have been the main U.S. consumers of milled grain products, malts, and starches. Domestic use of wheat flour grew over the past 5 years at about 2 percent annually as consumers have eaten more grain-based foods, notably pasta, bagels, and bread, in large part because of dietary changes. In 1996, U.S. consumption of flour set a post-World War II record of 149 pounds per capita, a gain of 10 pounds above the 1992 level.



# INTRODUCTION

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The scope of this summary includes milled grain products, malts, and starches that fall primarily in chapter 11 of the *Harmonized Tariff Schedule of the United States* (HTS). Other than wheat, the grains most commonly milled are corn, oats, rye, and rice. Among these products, milled wheat products are by far the most important in terms of domestic production and trade. These are followed by other milled grain products (milled corn, milled oats, milled rye, and milled rice),<sup>2</sup> malts, and starches. Thus, the order of presentation of these products in this report is as follows: milled wheat, other milled grain products (corn, oats, rye, and rice), malts, and starches.

## Milled Wheat

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In the United States, most wheat is milled into flour and meal and further processed to make products for human consumption. Wheat is also used in significant quantities for seeding and as livestock feed, and in small amounts for the manufacture of starch, gluten, and some industrial products. During crop years 1992/93<sup>3</sup> to 1996/97, food use of wheat in the United States accounted for 71 percent of domestic consumption; feed and residual use, 21 percent; and seed use, 8 percent.<sup>4</sup> Domestic food use of wheat increased at an average annual rate of 2.2 percent annually from 835 million to 910 million bushels during those 5 years. The “feed and residual” use of wheat has been quite volatile, with animal feeding of wheat rising during years when wheat quality is low or when large crops render wheat more cost-competitive with such alternative feed grains as sorghum or corn.

Flour millers grind and sift wheat into flour and millfeeds, separating the outer bran and germ from the inner, more digestible endosperm. The outer-kernel portions are typically used as millfeeds for livestock, while the endosperm is processed into flour. Flour millers are the leading U.S. processors of wheat although breakfast food, pet food, and feed manufacturers also process wheat.

### *Types of Wheat*

Millers of the four leading types of wheat (soft, hard, white, and durum) are found throughout the United States. Most mills specialize in the milling of either hard or soft wheats, with durum mills in a separate category altogether. Multiple-plant companies often have separate soft-wheat milling plants, hard-wheat milling plants, and durum milling plants. Durum milling plants tend to specialize solely in the production of semolina, and, in recent years,

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<sup>2</sup> Most milled rice products are classified under HTS chapter 10 and are discussed separately under the forthcoming summary on grain.

<sup>3</sup> The crop year begins June 1 and ends May 30.

<sup>4</sup> U.S. Department of Agriculture (USDA), Economic Research Service (ERS), *Wheat Situation and Outlook Yearbook*, March 1997, table 1.

some individual durum mills have become dedicated operations of, and located adjacent to, large pasta manufacturers.

The wheat most commonly grown in the United States is winter wheat. Hard red winter wheat, the principal class of winter wheat, has a medium to high protein content. It is primarily used to produce bread flour. Soft red winter wheat has a low to medium protein content; its chief use is for pastry flours. Durum wheat is seeded in the spring and is characterized by its hardness and high protein content. This class of wheat is used in the production of semolina (a coarsely ground flour or meal) for the manufacture of pasta products such as macaroni, spaghetti, and noodles. White wheat is seeded in the fall or spring and can either be hard or soft with a low protein content; white wheat is principally used in pastry flour and breakfast foods.

Generally, hard wheat is high in protein and gluten (a substance that gives dough a tough, elastic quality), and the flour milled from it is used in making bread. Soft wheat, on the other hand, contains less protein and is used mainly for cake, cracker, biscuit, and pastry flours. Although much of the wheat produced in the United States is milled “straight,” there is considerable blending of hard and soft wheats to obtain flours of various grades for baking.<sup>5</sup> Some wheat is also used as feed for animal consumption, as seed, and in alcoholic beverages. More recently, wheat has been used as an input in gasohol.

Milled grain products are classified for tariff purposes in either chapter 11 or chapter 23 of the HTS depending on the starch and ash content and the coarseness or thickness of the product (percentage passing through a metal sieve of prescribed aperture). In general, the more coarse material, more suitable for animal feed, is found in chapter 23. In addition, wheat gluten—a milled grain product—is not covered herein, but is described in the forthcoming summary on animal feed.

Milled wheat products fit for human consumption and classified in chapter 11 are edible products resulting from the process of grinding cleaned kernels of the various kinds and grades of wheat. Edible milled wheat products include white, cracked, and whole wheat (graham) flours, whether pure, blended, phosphated, or self-rising, and semolina. Wheat flour is not a uniform and homogeneous commodity, but varies considerably in composition; the various types and grades have different end uses. Flour types reflect the kernel characteristics of the wheat from which it is milled, and the various grades of flour are differentiated by the milling process employed. Prepared flour, mixes, and dough are classified in HTS heading 1901 and are included in the forthcoming summary on edible preparations.

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<sup>5</sup> Gluten is sometimes blended into lower-protein flour to boost the protein level in a flour product and thus to enhance its quality.

## *Description of Flour Types and Semolina*

In domestic markets, there are a large number of wheat flours tailored to specific food uses; semolina is also sold under different specifications, depending on the needs of the pasta producers.<sup>6</sup> Ordinary white-bread flour for bakers and food institutions is the leading domestic flour, accounting for slightly over half of domestic flour shipments in 1992 (the most recent year for which data are available). The leading types of flour shipments in the United States in 1992 were as follows:<sup>7</sup>

Item	Shipments (1,000 cwt)	Share (Percent)
White flour:		
Export shipments . . . . .	15,739,410	4
Domestic shipments:		
Bakers and institutional white bread-type . . . . .	215,110	55
Bakers and institutional soft-type . . . .	51,994	13
Self-rising family flour . . . . .	6,178	2
All other family flour . . . . .	41,135	11
Shipments to blenders and processors:		
For use in food products . . . . .	15,292	4
For use in nonfood products . . . . .	2,640	1
Other than white flour:		
Whole wheat . . . . .	5,853	1
Durum flour and semolina . . . . .	33,208	8
Other, including farina . . . . .	4,664	1
Total . . . . .	391,468	100

During 1987-92, there was little change in the composition of the types of domestic flour shipments, except for a slight increase in shipments of bakers and institutional wheat bread flour and a decline in wheat flour for export.

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<sup>6</sup> More than 15 types of wheat flour and semolina are defined for domestic commerce; see 21 CFR, c. 1, sec. 137.

<sup>7</sup> U.S. Bureau of the Census, *1992 and 1987 Census of Manufactures*; Grain Mill Products, table 6a-1.

## Milled Corn

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This summary also covers certain milled corn products, which mainly are those fit for human consumption; other types of milled corn products are considered to be animal feed and are covered in a separate summary. Legal note 3 to HTS chapter 11 defines which milled corn products fall within that chapter and which are relegated to chapter 23 as animal feedstuffs. The headnote defines corn meal and corn groats as products of which “at least 95 percent by weight passes through a woven metal cloth sieve wire aperture of 2 millimeters.” In general, animal feed byproducts from the dry-milling industry (e.g., hominy feed) and byproducts from the wet-milling industry (e.g., corn gluten feed and corn gluten meal) are included under the forthcoming summary on animal feed.

Milled corn products fit for human consumption include corn meal, grits (or hominy), and corn flour. Corn meal is made by grinding either whole corn kernels, degermed kernels, or degermed hulled kernels. Degermed kernels have had the germ removed, and degermed hulled kernels have had both the germ and the hard fibrous kernel covering (hull) removed. Most of the corn meal and virtually all of the grits and flour made in the United States are produced from degermed meal. In some southern areas of the United States, corn meal, grits, and flour are eaten regularly by human consumers. Most of the degermed meal and grits are used to produce cereal breakfast foods, prepared flour mixes, and other processed foods. Brewers use large amounts of grits, together with other ingredients, as malt adjuncts in the production of beer.

Milled corn products not fit for human consumption include cracked or ground corn that has been milled specifically for animal feed use and damaged meal (classified in chapter 23), flour, and other products originally intended for human use. Cracked or ground corn is fed to animals because it generally can be utilized more efficiently than whole-kerneled corn. Large amounts of cracked or ground corn are produced domestically by livestock feeders and commercial millers, but data on such production are not available.

In the United States, most corn is used as a feed grain. For such use, it is suitable for all classes of farm animals. It is lower in protein content than most other feed grains, but it has a higher total digestible nutrient content and is the standard against which other feed grains are compared.

Large quantities of corn are used by the wet-milling industry in the production of starch, dextrin, adhesives, and corn sweeteners. The commercial development of processes to produce high-fructose corn syrup, which has captured nearly all of the market for sweeteners in liquid products (particularly soft drinks), has led to a rapid increase in corn use by the wet millers.<sup>8</sup> Corn is also the principal feed stock for ethanol used in automobile fuel (gasohol).<sup>9</sup>

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<sup>8</sup> See the summary on natural sweeteners for description of the high-fructose corn syrup industry.

<sup>9</sup> See U.S. International Trade Commission (USITC), “Alternative Fuels: Challenges and

(continued...)

## Milled Oats

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Oats are used principally as a feed grain in the United States, but about 26 percent of domestic consumption of oats was in food, alcohol, and industrial use during 1992/93 to 1996/97.<sup>10</sup> Milled oat products fit for human consumption include rolled oats, oatmeal, and oat flour milled from high-quality, plump, white hulled oats. Having been hulled, white oats are either steamed and rolled into thin flakes, called "rolled oats," or ground into oatmeal and oat flour. Most of the "oatmeal" sold is not a "meal" in the ordinary sense; rather, it consists of rolled oats and is utilized as a breakfast food requiring cooking prior to consumption. Rolled oats is one of the most popular hot cereals consumed in the United States.

Oat flour, a byproduct of the manufacture of rolled oats, is used in the preparation of breakfast and infant (baby) foods. Because it contains an antioxidant, which delays the development of rancidity, oat flour is also used to preserve the taste and quality of some fat-containing foods. Small quantities are mixed into lard, margarine, and peanut butter or are dusted into potato chips and salted nuts. Small amounts of oatmeal and oat flour are also used in baked goods.

The bulk of the oats fed to livestock are ground without prior removal of the fibrous hull. These are called unhulled ground oats and are considered to be milled grain products not fit for human consumption (classified in HTS heading 2302). Oatmeal and similar oat products that have been damaged are also included in that category. Byproducts or wastes from the milling of oats are used chiefly for animal feed and are therefore discussed in the summary on animal feed.

## Milled Rye

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Rye grain is used in the United States primarily in milling and for the manufacture of distilled spirits. It is also used for seeding and as a feed grain. The bulk of imported rye is used for making whiskey and for milling into flour. Rye grain for use as feed is often ground because animals can utilize it more efficiently in that form. This section does not include the feed byproducts or wastes resulting from the milling of rye.

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<sup>9</sup> (...continued)

Opportunities for the U.S. Automotive Industry," *Industry Trade and Technology Review*, August 1993.

<sup>10</sup> USDA, *Feed Situation and Outlook Yearbook*, March 1997, p. 59.

Milled rye products fit for human consumption include rye flour and rye meal; rye is generally milled into three flour types:

Type	Color	Grind
White flour . . . . .	White	Fine
Medium flour . . . . .	Light grayish-brown	Medium
Dark flour . . . . .	Light grayish-brown	Coarse

Rye flour and meal alone produce a heavy, sour, nutritious bread. Rye dough retains only a small quantity of the yeast fermentation gases that cause dough to rise; thus, in the United States, rye bread is usually made from a mixture of rye and wheat flour. The result is rye-flavored bread. Domestic and imported rye flours and meals have generally been comparable in quality.

## Milled Rice

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Rice flour and rice meal are minor products of the rice milling industry. Most of the leading milled rice products are classified in HTS chapter 10—such as head rice, white rice, brown rice, and parboiled or converted rice—and discussed in the separate forthcoming summary on grain. Rice flour goes mainly into prepared baby food; about 44 million pounds of rice has been used annually in baby food, in recent years, according to USDA.<sup>11</sup>

## Malts

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Malt is the product made by germinating and then drying good-quality grain. This process involves an enzyme (diastase), which is capable of converting starch to sugar. Most malt is made from barley; small amounts of rye and wheat are also malted.

The preparation of malt involves the cleaning of sound and plump grain of varieties specially adapted for malting; the grain has been grown, harvested, and stored in a manner to keep it separated from other grain. The cleaned grain is carefully steeped (soaked in water) at controlled temperatures and for appropriate time periods so that the grain sprouts (i.e., the primary bud and rootlet) grow, forming new plants. The seed is germinated in a chamber designed to control moisture, temperature, and air flow. The dried grain, known as malt, is separated from the sprouts, themselves used as animal feed (and not included in this summary). The malt, which is virtually identical in appearance to the grain, has a distinctive odor and flavor.

Malt extracts (classified under HTS heading 1901) are made by evaporating a strained mash of malt and water to a syrup concentrate or a powder; 100 pounds of malt produce about 80

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<sup>11</sup> Parveen Setia, et al, *The U.S. Rice Industry*, USDA, Sept. 1994, pp. 35-36.



pounds of malt syrup. Malt extracts contain the maltose, dextrine, and soluble proteins and vitamins of the malt from which they were made.<sup>12</sup>

Malt used in the manufacture of food products (particularly breakfast foods, baked goods, and candy) is first converted to malt extract. Malt extracts are used principally in the confectionary industry. Some bakers use high-diastasic malt extract to improve the fermentation of dough, thus altering the texture of their products. Home brewing of beer has developed into a major use for malt extract in recent years. Malted-milk powder is produced by the addition of milk to the extract before it is dried.

Barley malt, which accounts for the bulk of the malt, is usually produced in the United States and Canada from six-row barley, whereas in Europe it is generally made from two-row barley.<sup>13</sup> The bulk of the U.S. output of barley consists of the six-row varieties; most U.S. brewers prefer malt of six-row varieties because its higher diastasic power allows the use of more malt adjuncts (usually corn grits or brewer's rice) in the manufacture of beer and distilled alcoholic beverages. European malt has a higher extraction rate (i.e., it yields more sugar from the malted grain) than the U.S. malt.

In addition to its use in the manufacture of beer and distilled alcoholic beverages, barley malt is used to make nonalcoholic cereal beverages and beverage preparations, breakfast foods, candy, and other food products. Rye malt is used principally in making whiskey. Wheat malt, which is of minor commercial importance, is used principally in the manufacture of food products.

## Starches

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Starch is the stored form of food for most plant life. It is commercially extracted from grains—corn, sorghum, wheat, and rice; from roots or tubers—potatoes, sweet potatoes, cassava (the source of tapioca), and arrowroot; and from the pith of the sago palm. The starches and flours of arrowroot, cassava, and sago—all tropical plants not grown in the United States—constitute the bulk of U.S. imports of starches, while corn starch makes up the bulk of U.S. production and consumption of starch. Starches extracted from wheat and other grains and potatoes are also included. Although starch and flour are generally considered in the trade to be identical products when obtained from arrowroot, cassava, and sago, they are commercially distinct products when made from potatoes or grains.

Most domestic output of starch is used in the manufacture of other products. Starch is converted into syrup and sugar (chiefly for foodstuffs), into dextrine<sup>14</sup> (an adhesive important for many industrial uses), or into other products in a wide range of manufacturing processes.

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<sup>12</sup> See the forthcoming summary on edible preparations.

<sup>13</sup> The barley head, or spike, consists of a zigzag stem (rachis) with groups of three kernels (spikelets) arranged alternately on opposite sides of the rachis. In six-row varieties all three spikelets at each rachis joint are fertile, whereas in the two-row varieties only the central spikelet develops.

<sup>14</sup> Dextrine and soluble or chemically treated starches are not included in this summary; these products are classified in HTS heading 3505.10.

Some commercial starch is used as an ingredient of various food products and in laundry work.

Starch granules, when immersed in hot water, swell and rupture (gelatinize), forming a paste that, when cooled, turns into a semitransparent substance with a glossy surface. The adhesiveness of this substance and its property of forming a smooth surface account for most of the industrial uses for starch, but the properties of the starches, including the size and shape of their granules, vary depending on the raw material from which they are produced. For some purposes, one starch will be chosen because it has certain distinctive and desired characteristics; for other purposes, the choice of a starch can be determined by price. Starches are treated or modified to alter their characteristics and make possible their use for an even larger number of purposes, and thus for most purposes, all starches are interchangeable or can be modified to perform adequately.

The principal uses of corn starch are in the manufacture of syrups, sugar, and dextrines by the corn starch producers; other consuming industries include papermaking, textiles, laminating and corrugating, laundry, and brewing. Potato starch is used principally in making paper, textiles, adhesives, and food specialties. Wheat starch can be used in laundry starches, textiles, paper, adhesives, and food products. Rice starch is high-priced and used in small quantities for special purposes, such as silk-screen printing. Tapioca is used principally in making paper, food products, adhesives, and textiles; sago is consumed chiefly in manufacturing textiles and adhesives. Arrowroot starch is a high-priced starch consumed almost wholly in food products.

## **U.S. INDUSTRY PROFILE**

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### **Industry Structure**

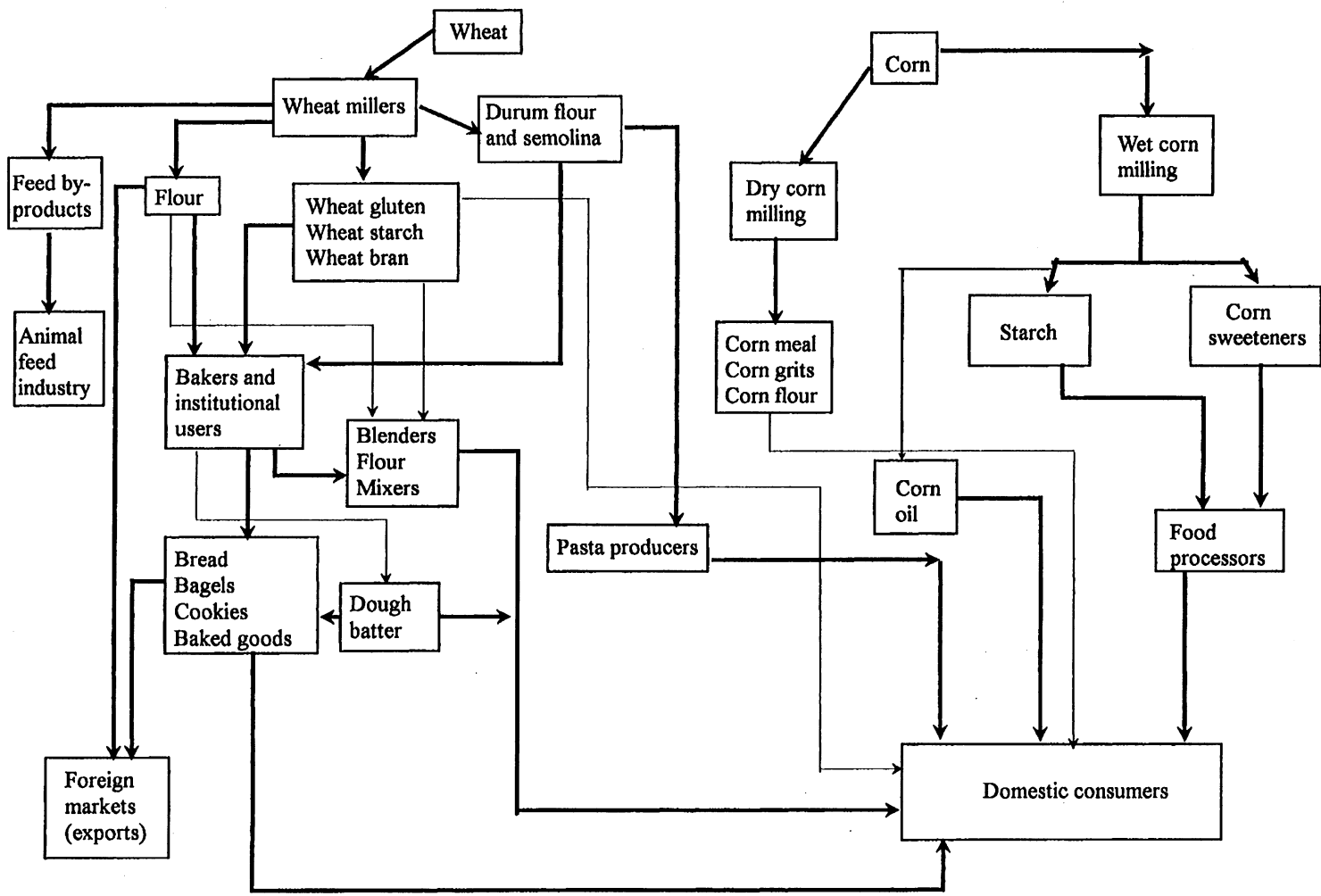
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The structure of the U.S. grain milling industry is illustrated in figure 1. There are four Standard Industrial Classification (SIC) categories applicable to the industry: 2041, flour and other grain mill products; 2044, rice milling; 2046, wet corn milling; and 2083, malt. Most of the leading products are produced in the flour and grain milling industry covered under SIC 2041. Of the \$9.1 billion of U.S. shipments in 1995 (the latest year for which U.S. shipments are available)<sup>15</sup> about 61 percent were milled wheat products classified under SIC 2041; 15 percent were corn starch products classified under wet corn milling, SIC 2046; 12 percent were dry corn milled products classified under SIC 2041; 7 percent were malt under SIC 2083; and the remaining 5 percent were other grain milling products (SIC 2041 and 2046). During 1992-95, the value of U.S. shipments of all milled grains, malts, and starches rose steadily by 4.6 percent annually from \$7.9 billion to \$9.1 billion (table A-1).

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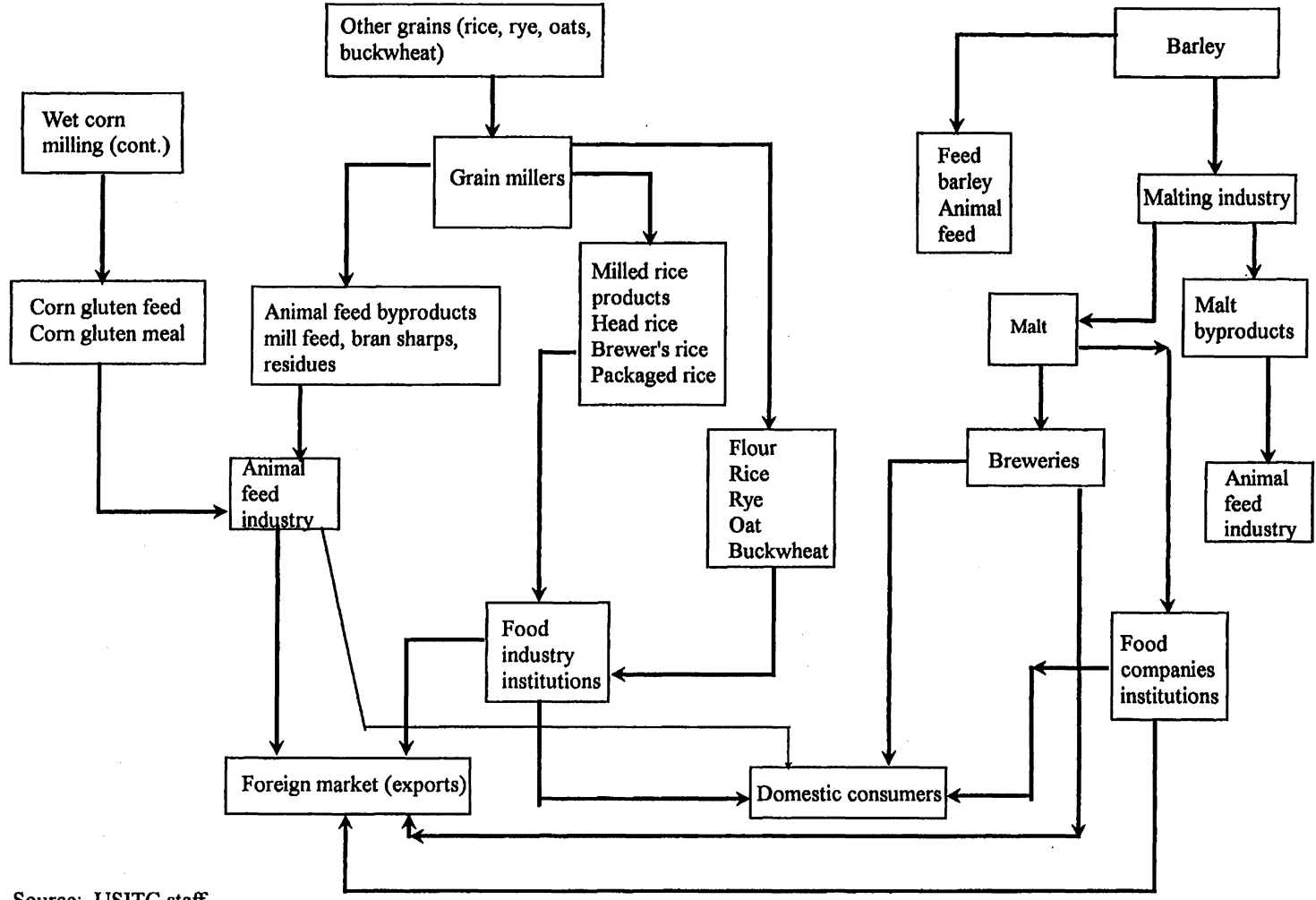
<sup>15</sup> U.S. Bureau of the Census, *1995 Annual Survey of Manufactures: Value of Products Shipments*, Jan. 1997, table 1.

Figure 1  
Milled grains, malts, and starches: Structure of the U.S. industry



11

Figure 1--Continued  
 Milled grains, malts, and starches: Structure of the U.S. industry



Source: USITC staff.

(Statistical tables are in appendix A. An explanation of tariff and trade agreement terms is shown in appendix B).

### *Number, Types, and Capacity of U.S. Industry*

The number of U.S. companies producing milled grains, malts, and starches during 1987-92 declined by 4 percent to 318 (table A-1). The companies operated 495 establishments in 1992, 257 of which had 20 employees or more each.

During 1992-94, the rate of capacity utilization rose slightly to 83 percent for the U.S. grain milling, malt, and starch industries, as shown in the following tabulation (in percentage).<sup>16</sup>

<b>Industry</b>	<b>1992</b>	<b>1994</b>
Flour and other grain mill products . . . . .	82	91
Rice milling . . . . .	83	95
Wet corn milling . . . . .	96	96
Malt . . . . .	100	97
Grain mill products <sup>1</sup> . . . . .	82	83

<sup>1</sup> SIC 204, grain mill products.

Capacity utilization for the wheat flour and other grain mill products industry (SIC 2041) rose sharply, from 82 to 91 percent in 1994 (the latest year for which data are available). The much higher rate of utilization for the wheat milling industry also propelled a sharp increase in additional capacity as explained below.

### *Wheat Milling Industry*

The 24-hour capacity of the U.S. wheat milling industry rose from March 1993 to December 1996 by 6 percent to 1,409,000 hundredweight of flour equivalent.<sup>17</sup> Much of the additional capacity has been added in new plants located closer to the leading consuming regions in the United States and away from traditional milling areas in wheat-growing states. In 1996, the rate of capacity utilization (rate of milling “grind”) reached 91.4 percent, despite the larger capacity.<sup>18</sup>

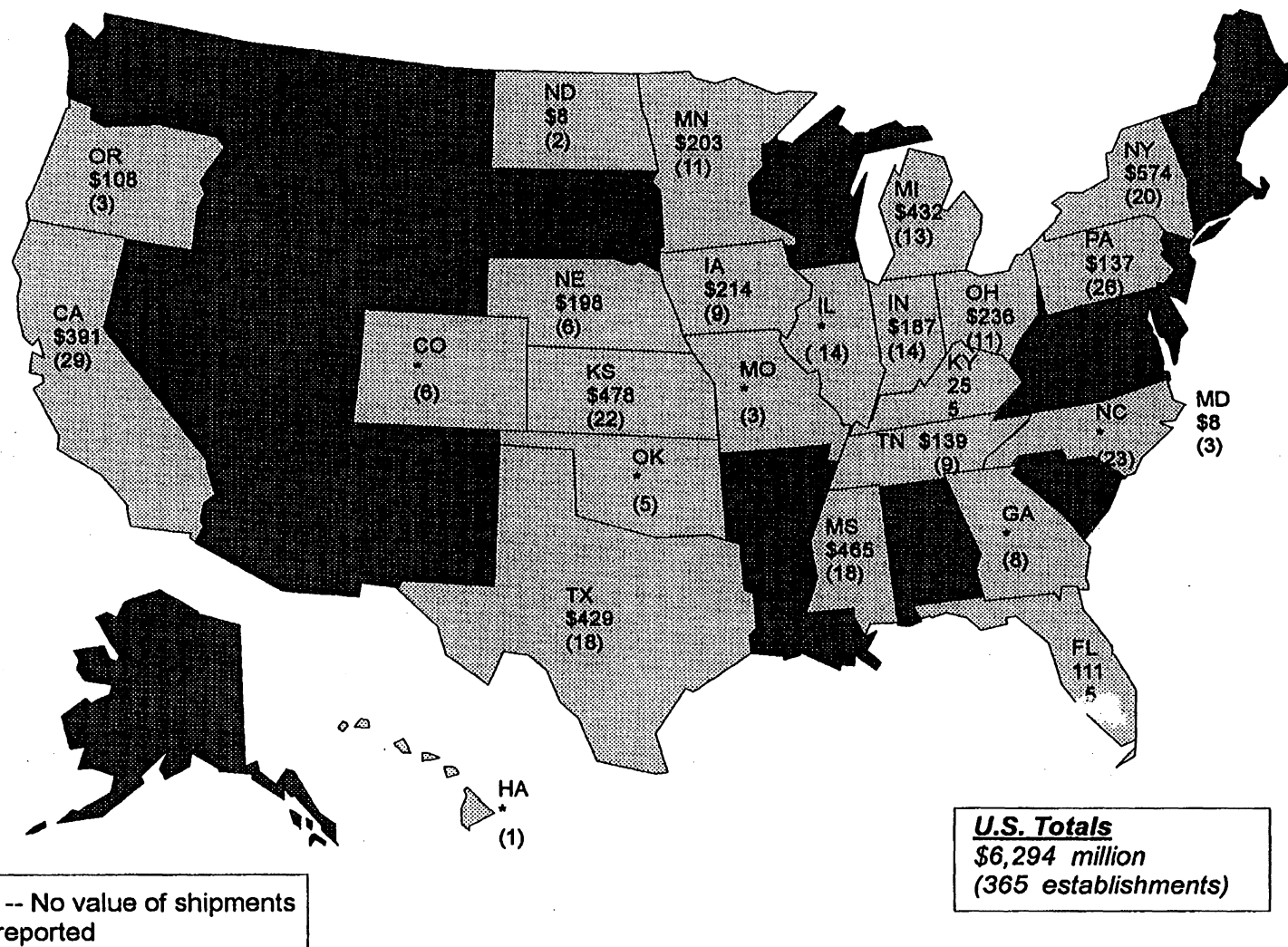
Wheat flour and other grain mills, the key domestic component of this industry, are widely distributed in 29 States; however, based on the value of shipments, 7 States accounted for about half of the 1992 shipments: New York, Kansas, Minnesota, Missouri, Texas, California, and Tennessee (figure 2). The traditional centers of wheat milling activity in the United States are Kansas City, Missouri; Minneapolis-St. Paul, Minnesota; and Buffalo, New York.

<sup>16</sup> U.S. Bureau of the Census, *Survey of Plant Capacity*, Fourth Quarters, 1994, table 1.

<sup>17</sup> U.S. Bureau of the Census *Flour Milling*, various years capacity estimates prior to March 1993; are not directly comparable.

<sup>18</sup> “U.S. flour production in ‘96 up 1.9%,” *Milling & Baking News*, Feb. 11, 1997, p. 10.

Figure 2  
 Flour and other grain mill products: Value of U.S. shipments and the number of U.S. establishments, by State, 1992



Source: U.S. Bureau of the Census, 1992 *Census of Manufactures*, table 2.

The larger capacity of domestic mills has occurred partly because of the economics of scale in processing, procurement, finance, and transportation. The smaller U.S. wheat milling establishments (each with less than 1,000 hundredweight (cwt) of daily flour processing capacity) have declined in number, while the number of hard, soft, and whole-wheat mills with a 10,000 cwt or more daily capacity have expanded.<sup>19</sup> Mills increased their processing capacity not simply by building physically larger facilities, but also by adding new equipment with greater capacity. The larger capacity plants generally have less-than-proportionate increased energy, equipment, and labor costs than the smaller plants.<sup>20</sup>

Transportation costs in moving wheat and thereafter moving flour and byproducts to consumers have played a key role in plant location over the years. The three traditional milling centers have enjoyed low costs in terms of transportation and access to U.S. wheat supplies. However, wheat milling has become more geographically distributed over the past decade with the deregulation of railroads and the desire on the part of millers to be closer to consumers.

Wheat millers of the different types of wheat are scattered across the United States; most plants specialize in the milling of either hard or soft wheat, with a distinct subgroup of plants milling only durum wheat.<sup>21</sup> The milling equipment, particularly for soft wheat, varies depending on the general type of wheat being milled. Durum mills can be switched to mill other types of hard wheat, but generally durum mills specialize only in durum.

Included in the wheat milling sector are millers of miscellaneous grains, including "dry corn," rye, oats, and buckwheat. The "dry corn" milling industry had U.S. shipments of \$1,049 million in 1995, with its leading products mostly being corn flour, corn grits, and other corn products destined for food, according to data of the U.S. Department of Commerce. Shipments of dry corn milled products amounted to \$776 million in 1992 when there were 11 companies with U.S. shipments of \$100,000 or more each producing corn flour and 18 such companies producing other corn mill products for food (table A-1). U.S. shipments of other milled grain products from rye, oats, and buckwheat amounted to \$249 million in 1995, a 43 percent rise from the \$173 million shipped in 1992. In that year, there were 10 U.S. companies with annual shipments of \$100,000 or more each. The reported daily 24-hour processing capacity of U.S. rye mills was 11,000 cwt in December 1996, unchanged from 1993.<sup>22</sup>

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<sup>19</sup> Joy Harwood, Mack Leath, and Walter Heid, *The U.S. Milling and Baking Industries*, USDA, Dec. 1989, p. 9.

<sup>20</sup> *Ibid.*, p. 10.

<sup>21</sup> *Ibid.*, p. 2.

<sup>22</sup> U.S. Bureau of the Census, *Flour Milling*, table 3, various years.

## ***Wet Corn Milling Industry***

The second largest component of the milled grain, malts, and starches industry is the wet corn milling industry. Wet corn milling occurs mainly in three Corn Belt States, Iowa, Indiana, and Illinois, that together supplied over two-thirds of the \$7.5 billion of 1995 shipments of wet corn milling shipments (table A-1). Output of this industry is primarily motivated by production of corn sweeteners (which account for over half of this industry's product shipments), corn starch, and corn oil. Corn starch accounted for 19 percent of the value of shipments of this industry in 1995. In the Corn Belt, the mills are adjacent to supplies and to the transportation networks for shipping these bulk products.

## ***Malt Industry***

In 1992, the domestic malt industry was composed of 16 companies (each with annual shipments of \$100,000 or more) located in Minnesota, Washington, North Dakota, Idaho, Colorado, and Wisconsin. Shipments of the malt industry reached \$676 million in 1995, about 18 percent above the \$573 million shipped in 1992. On a quantity basis, shipments have been relatively flat during the 1980s and 1990s, reflecting the similar trend among domestic beer companies (breweries).<sup>23</sup>

The malting industry became more vertically integrated over the past decade as major brewers have constructed or acquired malting houses. The two largest U.S. malting companies are also the two largest world producers of malt as well.<sup>24</sup> Brewer-maltsters, which use their malt production in their own breweries, accounted for 28 percent of U.S. malt output in the early 1990s.<sup>25</sup> The remaining domestic malt is produced by maltsters that earn virtually all of their income from the sale of malt. The four largest maltsters are believed to account for 60 percent of the U.S. malt production.<sup>26</sup>

## ***Starch Industry***

The starch industry in the United States comprises three separate industries: the wet corn milling industry (mentioned above), the potato starch industry, and the wheat starch industry. In 1992, there were fewer than 20 companies producing starch in the United States: 13 companies shipped modified corn starch in 1992 (each with annual shipments of \$100,000 or more), and 5 companies shipped unmodified wheat or potato starch. Corn starch producers, the largest group in this industry, shipped about \$1.4 billion of products in 1995, little changed from the \$1.3 billion of shipments in 1992.

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<sup>23</sup> See the *Industry and Trade Summary on Malt Beverages*, USITC Publication 2865, April 1995, pp. 22-23.

<sup>24</sup> David Wilkes, "The World Malt Market," *World Grain*, Oct. 1997, p. 7.

<sup>25</sup> D. Demcey Johnson and Lillian Wilson, North Dakota State University, *North American Barley Trade and Competition*, Feb. 1994, p. 30.

<sup>26</sup> *Ibid.*



The potato starch industry is believed to be made up of a half-dozen plants, located principally in Idaho, Colorado, and Maine, the largest being in the Western States. Many of the plants are small and operate only part time, and a number of plants have closed over the past decades.

Although potato starch is the only product for most of the plants, some of the larger ones also market potato pulp for use in animal feeds. In crop year 1995/96, 1.7 million hundredweight (cwt) of fresh potatoes were utilized to make potato starch and flour.<sup>27</sup>

The wheat starch industry consists in recent years of fewer than six companies located in Kansas, Illinois, Iowa, and Minnesota. Wheat starch is produced as a co-product of wheat gluten, and the strong domestic demand for gluten has encouraged output of wheat starch as well. The processing capacity of U.S. wheat starch and gluten production facilities has increased sharply in recent years with the opening of new facilities and the addition of new equipment.<sup>28</sup>

### *Employment*

The milled grain, malt, and starch industry is a manufacturing industry employing persons primarily engaged in direct production; some are also engaged in financial, managerial, and marketing roles as well. In 1995, U.S. employment in this industry was 27,400 persons, of whom 19,500 (71 percent) were production workers (table A-1). During 1992-95, employment in the U.S. grain milling industry remained flat at about 27,400.

During 1992-96, wages of U.S. grain milling employees increased by 3.8 percent annually, slightly above the prevailing 2.4 percent rate of inflation and the 3.1 rate of increase for all private production workers.<sup>29</sup> During these 5 years, average wage rates for grain milling employees rose to \$12.43 per hour, slightly above the average \$12.06 per hour rate that U.S. private production workers received, as shown in the following tabulation compiled from official data of the U.S. Department of Labor (in dollars per hour):

Period (in December)	Average hourly earnings:	
	Wheat milling	All private, U.S. production
1992 .....	\$10.72	\$10.71
1993 .....	10.76	10.97
1994 .....	11.47	11.21
1995 .....	12.36	11.64
1996 .....	12.43	12.06

<sup>27</sup> USDA, Agricultural Statistics Board, *Potatoes*, Sept. 1996, p. 4.

<sup>28</sup> According to data of USDA, ERS, Feb. 15, 1996.

<sup>29</sup> Inflation, as measured by the GDP implicit price deflator, rose from 100 in 1992 to 109.7 in 1996. U.S. Department of Commerce, *Survey of Current Business*, table 7.1, Jan./Feb. 1996 and April 1997.

## ***Labor Intensity, Skill Levels, Level of Automation, and Productivity***

Large grain mills operate on a continuous flow basis with relatively few employees (other than those brought in for equipment maintenance), because of the introduction of computerized controls. Grain milling is a capital and energy intensive industry, but the cost of purchased materials (mainly grain) accounted for about 73 percent of the value of shipments in 1995.<sup>30</sup>

Total labor (payroll) costs are small in relation to shipments, accounting for 6 percent of total shipments in 1995.

Total labor productivity in the grain milling industry rose by 7.1 percent annually during 1992-95, as measured by value-added by manufacture. In 1992, the value-added per grain milling employee was \$200,000 (table A-1); by 1995, the average employee produced \$246,000 in value-added. The greater labor productivity may be attributed in part to more intensive mechanization, the closing of the more antiquated plants, and the opening of more modernized mills.

The domestic milling industries have continued to invest substantial amounts in adding capacity and mechanization. New capital expenditures rose from \$254 million in 1992 to \$300 million in 1995 in the flour and other grain mill industries (SIC 2041), according to data of the U.S. Bureau of the Census.<sup>31</sup>

## ***Vertical and Horizontal Integration***

There are six principal industrial groupings in this industry, as reflected in figure 1: the wheat millers, the dry corn millers, the wet corn millers, the miscellaneous grain millers, the starch industries, and the malting industry. Many of the larger wheat and wet corn milling facilities are owned by the same companies.

USDA has classified domestic wheat milling companies into four major categories:<sup>32</sup>

- Multi-unit flour millers (the "majors") that are diversified into processing and commodity operations (such as Cargill, ADM, and ConAgra);
- Vertically integrated food processors that both purchase and process flour from the majors (Pillsbury, General Mills, and Nabisco);
- Millers that are primarily flour producers within a single U.S. region (Fisher Mills, Dixie Portland, and Mennel); and
- Small millers with one or two establishments in local markets and specialty products (Roman Meal).

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<sup>30</sup> *Annual Survey of Manufactures*, 1995 (for SIC industry 2041).

<sup>31</sup> *Ibid* and *1992 Census of Manufactures*, June 1995, table 1a.

<sup>32</sup> Harwood, Leath, and Heid, *The U.S. Milling and Baking Industries*, p. 4.

In general there has been a sharp increase in the concentration of ownership ratios in the wheat milling industry over the past decade, as measured by processing capacity and by shipments. In 1994, the 4 largest U.S. wheat milling companies had 70 percent of the processing capacity in the United States, and the 8 largest had 85 percent of the capacity, according to a private trade estimate.<sup>33</sup> In 1992, the 4 largest grain-flour milling companies had 56 percent of the shipments and the 8 largest companies had 68 percent.<sup>34</sup> In 1993, 27 U.S. firms accounted for virtually 100 percent of U.S. production of wheat flour and semolina, according to data submitted to the Commission.<sup>35</sup>

In 1994, the 4 largest U.S. durum milling companies accounted for 52 percent of the U.S. capacity, and the 8 largest companies accounted for 65 percent of the capacity, according to Milling and Baking News. Some of the so-called durum capacity is "switch capacity" used for durum or for hard wheat milling.

In the wet corn milling industry (SIC 2046), economic concentration is even greater. In 1992, the 4 leading companies had 73 percent of U.S. shipments, and the top 8 companies had 93 percent of the shipments, according to U.S. Census Bureau data.

Within the malt industry, there has been a similar increasing concentration of ownership with the gradual elimination of single-plant private firms by large multinational firms. In addition, Canadian malting companies have purchased U.S. companies, and U.S. companies Canadian ones, further raising economic concentration. U.S. breweries have similarly integrated upstream into malting, expanding their share of U.S. malting capacity to 28 percent in 1992, according to an industry study.<sup>36</sup>

### ***Extent of Globalization of Industry***

Most of the leading grain milling companies are diversified, multinational commodity companies operating in many countries, either directly or with international subsidiaries. Among the wheat millers, two companies that operate in the United States have ownership connections to European agribusiness.<sup>37</sup>

With regard to U.S. wet corn millers, a French agribusiness in 1995 purchased the fifth largest U.S. corn processor. The French company is the largest European starch producer and the largest European wheat processor.<sup>38</sup> In the wheat starch industry, a large U.S. producer is a subsidiary of an Australian multinational enterprise.

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<sup>33</sup> Milling & Baking News, *1994 North American Grain & Milling Annual*, 1994, pp. 67-70.

<sup>34</sup> U.S. Bureau of the Census, *1982 Census of Manufactures: Concentration Ratios in Manufacturing*, p. 7-56; and *1992 Census of Manufacturing: Concentration Ratios in Manufacturing*, table 3. These data are for SIC 2041.

<sup>35</sup> USITC, *Wheat, Wheat Flour, and Semolina*, Inv. No. 22-54, Publication 2794, July 1994, p. II-31.

<sup>36</sup> Johnson and Wilson, *North American Barley Trade and Competition*, Feb. 1994, p. 30.

<sup>37</sup> Harwood, Leath, and Heid, *The U.S. Milling and Baking Industries*, p. 14.

<sup>38</sup> "Corporate Profile: Cerestar," *World Grain*, June 1996, pp. 6-8. This company operates the world's largest wheat processing plant in Germany.

## Marketing and Pricing Practices

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The marketing channels used in the grain mills industry are shown in figure 1. Milled grain products are important food items, widely traded throughout the world and in the United States. The leading milled grain product, wheat flour, tends to be sold as a bulk commodity on the basis of price, both domestically and abroad. Transportation in marketing this bulk product is important, and access to rail lines or water transport is a factor in plant location. The primary users of wheat flour—the baking and pasta industries and flour mixers—compose a consumer goods industry that is widely dispersed geographically, and linked to retail supermarkets and to food companies or institutional users through brand names, promotion, and other such selling devices.

Because price is often an overriding factor in the purchase decision of baking flour, futures and cash markets are closely followed by the trade. The United States has three widely used futures and cash markets in Kansas City, Minneapolis, and Chicago. With no futures market for wheat flour, the wheat futures market is often used to “piggyback” the prices of wheat flour, which tend to move in tandem with changes in wheat prices.

## U.S. Government Programs

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### *Export Enhancement Program*

Congress created the Export Enhancement Program (EEP) in 1985 under the 1985 Farm Bill and continued it in the 1990 Farm Bill, the 1994 Uruguay Round Agreements Act, and the 1996 Farm Bill (the Federal Agriculture Improvement and Reform Act). The purpose of the EEP program was initially to allow U.S. agricultural exporters to lower their export prices in selected markets characterized by unfair competition, particularly from the European Union (EU), and since 1996 to encourage market development abroad.<sup>39</sup> Exporters receive bonuses that allow them to reduce the price of the U.S. agricultural product in the designated foreign market.<sup>40</sup> However, from August 1995 through the end of 1996, USDA paid no EEP bonuses for grain and milled grain product exports.<sup>41</sup>

EEP assistance has been available for a wide variety of grain and milled grain products, including wheat and wheat flour, rice, barley, malting barley, and barley malt. Since the program's inception, the vast majority of EEP sales have been of wheat, followed by feed grains (barley), wheat flour, and vegetable oil.<sup>42</sup>

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<sup>39</sup> USDA, ERS, “Provisions of the 1996 Farm Bill—the Federal Agriculture Improvement and Reform (FAIR) Act,” *Agriculture Outlook*, April 1996, p. 15, and USDA, *Farmline*, July 1991, p. 4.

<sup>40</sup> USDA Office of Public Affairs, “USDA Changes Payment Mechanism for EEP and DEIP,” Nov. 6, 1991.

<sup>41</sup> USDA, ERS, *Wheat Situation and Outlook Yearbook*, March 1997, p. 13.

<sup>42</sup> Karen Ackerman and Mark Smith, USDA, ERS, Commercial Export Assistance, May 1993; and “The Export Enhancement Program,” *Outlook for U.S. Agricultural Exports*, May 27, 1993. In FY 1993, EEP bonuses for wheat accounted for 80 percent and for wheat flour 8

(continued...)

U.S. exports of wheat flour under the EEP fluctuated between 250,000 and 757,000 metric tons annually during crop years 1992-95. In 1996, no EEP sales were made. Bonuses paid for wheat flour exports fell from \$101 per metric ton in fiscal year 1992 to \$88 per metric ton in FY 1995; no EEP wheat flour sales occurred in FY 1996. Total expenditures for EEP wheat flour bonuses rose from \$25 million to \$78 million during fiscal years 1992-94, and then fell markedly to \$27 million in 1995, as shown in the following tabulation:<sup>43</sup>

<b>Fiscal year</b>	<b>Wheat flour export volume (1,000 tons)</b>	<b>Total bonus (\$1,000)</b>	<b>Average bonus (\$/MT)</b>
1992	253	25,428	101
1993	757	78,213	103
1994	556	78,069	104
1995	310	27,469	88

U.S. exports of barley malt under the EEP rose from 32,000 metric tons in 1992 to 113,000 tons in 1995. No EEP sales occurred in FY 1996. Total bonuses paid for barley malt peaked in FY 1994 at \$10 million and then declined to less than \$4 million in FY 1995, as shown in the following tabulation (compiled from official USDA data):

<b>Fiscal year</b>	<b>Barley malt export volume (1,000 tons)</b>	<b>Total bonus (\$1,000)</b>	<b>Average bonus (\$/MT)</b>
1992	32	2,093	65
1993	55	4,373	80
1994	65	9,550	147
1995	113	3,741	33

In August 1995, EEP bonuses were halted as higher world prices for wheat and wheat flour and lower EU export restitutions (subsidies) made these bonuses unneeded.<sup>44</sup> In April 1996, Congress altered provisions of the EEP program to include market development as a policy goal, and limited total EEP expenditures for all agricultural exports to \$350 million in FY 1996.<sup>45</sup>

### ***Export Credit Guarantee and P.L. 480 Programs***

USDA also provides a guarantee of private credit used to finance the purchase of U.S. wheat flour and other eligible agriculture products and a program to donate agricultural products for relief or humanitarian assistance (so-called Public Law 480 exports). The GSM-102 (Export Credit Guarantee Program) provides credit for loans of up to 3 years, and the GSM-103

<sup>42</sup> (...continued)

percent of the total value of all EEP bonuses given for all commodities of \$967 million.

<sup>43</sup> USDA, Economic Research Service, fax transmission, July 23, 1996.

<sup>44</sup> USDA, ERS, *Wheat Situation and Outlook Yearbook*, March 1997, p. 13.

<sup>45</sup> USDA, ERS, "Provisions of the 1996 Farm Bill—the Federal Agriculture Improvement and Reform (FAIR) Act," *Agricultural Outlook*, April 1996, p. 15.

(Intermediate Export Credit Guarantee Program) provides credit for loans of 3 to 10 years in duration. Credit guarantee programs focus on maintaining U.S. sales levels abroad by assisting U.S. exporters with sales in countries with foreign exchange constraints. In recent years, newly independent states of the former Soviet Union have figured most prominently in these credit guarantee efforts, although developing countries have also benefited. In FY 1996, there were credit guarantee allocations for 2,498 metric tons of wheat flour (valued at \$0.8 million) under the GSM-102 and GSM-103 programs, with 108,000 metric tons of malting barley (valued at \$27.5 million).<sup>46</sup>

An additional 192,000 metric tons of wheat flour (valued at \$62 million) were exported in FY 1996 under concessional programs of Public Law 480 and for humanitarian relief and international development.<sup>47</sup>

## **Research and Development Expenditures and High-Technology Processes**

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As a manufacturing operation, grain millers have increasingly utilized automation and computer-directed controls for actual milling operations. Computer-aided design and computer-driven equipment have been introduced over the past decade in most U.S. mills to ensure precise calibration and tolerances. Moreover, over the past decade, other technology changes in durum wheat milling and pasta production were just-in-time (JIT) manufacturing, high and ultrahigh drying (for pasta), and closed system, clean-in-place (CIP) mixing technology.<sup>48</sup> Just-in-time manufacturing is designed to reduce inventories and, in the case of grain milling, reduce the volume of grain stored or in the process of being milled, and thereby reduce capital costs. For pasta, the wheat milling industry is introducing high or ultrahigh temperatures in drying the product, with the goal of increasing the speed of production. CIP mixing technology is directed at reducing the downtime for cleaning equipment and maintaining cleanliness and sanitary manufacturing practices.

The introduction of much of this higher technology machinery was motivated by the need to increase plant capacity. However, the higher technology also allowed greater control over the quality of the output, particularly milled wheat products.

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<sup>46</sup> USDA, ERS, fax transmission, Oct. 31, 1997. There were credit guarantees for wheat exports of 5.2 million metric tons (valued at \$1.1 billion) in FY 1996.

<sup>47</sup> USDA, ERS, fax transmission, Sept. 20, 1997.

<sup>48</sup> Tranquillo Deotto, "Commercial Pasta Processing Technology: What's New," lecture at Durum Wheat/Pasta Conference, Northern Crops Institute, Fargo, N.D., July 31, 1996.

# U.S. MARKET

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## Consumer Characteristics and Factors Affecting Demand

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### *Characteristics of Consumers or Users*

As indicated in figure 1, the leading milled wheat product is flour used mainly in bread, cakes, crackers, cookies, breakfast cereals, soups, and prepared foods; by contrast, semolina, the coarser durum wheat product, goes mainly into pasta. Byproducts of wheat flour which become millfeed, are mainly wheat bran, middlings, millrun, shorts, red dog, and germ meal. Millfeeds go largely into animal feed, and are discussed in the separate forthcoming summary on animal feed. Also discussed in a separate summary on edible preparations is a co-product of wheat starch, wheat gluten, a 75-percent-protein product obtained from a "washing" of wheat flour and water.

The uses of wheat flour depend on the type and protein level of wheat used to produce the flour, as shown below in the following tabulation:<sup>49</sup>

Classes of wheat	Qualitative factors of use	Primary food use
Hard red winter . . . . .	Good milling and baking characteristics, wide range of protein levels	All flours, but primarily bread flour, blended with weaker wheats for bread flour, whole wheat breads
Soft white . . . . .	Low protein	Breakfast cereals, oriental noodles, crackers, donuts, layer cakes, foam cakes
Soft red winter . . . . .	Low protein	Flour for cakes, pastries, quick breads, crackers, snack foods
Hard red spring . . . . .	Excellent protein level and milling qualities	All flour, primary bread flour, white bakers' bread and rolls
Durum . . . . .	Highest protein level	Semolina for pasta products

The protein level of the wheat is the primary consideration affecting the quality of the flour and thus the type of bakery or food products to which the flour is allocated. In most hard wheat mills, 75 to 80 percent of flour output is typically "short patent flour;" the remaining

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<sup>49</sup> Harwood, Leith, and Heid, *The U.S. Milling and Baking Industries*, p. 17.

portion is "first clears or second and fancy clears."<sup>50</sup> The protein content of hard wheat flour varies from 11 percent for straight flour to 25 percent for fancy, extra-short flour. For soft wheat mills, half of the flour output is typically fancy patent cake flour and half is fancy clears flour. Much of the soft wheat flours are destined for cookies, cake mixes, crackers, and food canners making soups and sauces. Protein characteristics also play an important role in soft flour uses. There is a high degree of substitution between Hard Red Spring and Hard Red Winter, depending on the protein levels.

Starch is used largely as an intermediate product in the production of corn syrup and other products. The increased use of high-fructose corn syrup (HFCS) in beverages over the past decade has propelled domestic use of starch. Other than in HFCS, direct use of corn starch is mainly in industrial uses (such as papermaking) rather than in food; during 1991/92 to 1995/96, 85 percent of starch use was in industrial products and 15 percent in food products.<sup>51</sup>

### ***Factors Influencing the Demand for Milled Grain Products***

U.S. wheat flour consumption has risen steadily during 1992-96, driven upwards by changing consumer preferences for more grain-based foods. Price changes have had relatively little effect on the total quantity of milled grain products demanded; U.S. demand for wheat (and wheat flour) is generally believed to be price inelastic, with elasticities ranging from -0.1 to -0.2, according to economic literature.<sup>52</sup> However, over the past two decades, significant changes in the U.S. lifestyle (more women in the workforce), in knowledge and perceptions of nutrition, in demographics (higher U.S. population and changed ethnic composition), and in the bakeries' and food producers' use of flour were factors that steadily buoyed U.S. demand for flour.<sup>53</sup> The varied and many forms in which flour can be eaten—for example, in hamburger buns, many specialty breads, bagels, and pizza, propelled the rising demand for flour. U.S. consumption of pizza has accounted for an estimated 8 percent of U.S. flour consumption in recent years, according to an industry estimate.<sup>54</sup>

Domestic per capita consumption of wheat flour rose from 139 pounds per capita in 1992 to 144 pounds in 1994, declined slightly to 142 pounds in 1995, and then reached 149 pounds in 1996 (the highest per capita level since 1947).<sup>55</sup> This reversal in U.S. flour consumption represented a sharp change in the typical consumption pattern in most developed countries, where consumers generally eat less grain-based foods as per capita incomes rise. USDA and the U.S. Food and Drug Administration indicated that health concerns were a primary motivation in this change in the diets of U.S. consumers, who were encouraged by recommendations from various U.S. medical and health groups and USDA itself, through its

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<sup>50</sup> Ibid., p. 19.

<sup>51</sup> Estimate of USDA. See table 10.

<sup>52</sup> See USITC, *Wheat, Wheat Flour, and Semolina*, USITC publication 2794, p. II-83.

Demand for feed wheat is generally viewed to be much more price elastic than food (milling) wheat for flour, given the substitution of feed wheat for corn.

<sup>53</sup> See Morton Sosland, "Prospects for Flour Markets," *World Grain*, Sept. 1997, p. 10.

<sup>54</sup> Ibid.

<sup>55</sup> USDA, ERS, *Wheat Situation and Outlook Yearbook*, March 1997, p. 84.



"Food Pyramid", to eat more grain-based products.<sup>56</sup> The changes in lifestyle, with more meals eaten out of the home (rising sales of hamburger buns and pizza dough), and the emergence of new grain-based foods (bagels, flour tortillas) played a role as well.

## **Consumption**

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### ***Trends and Import-Penetration Levels***

Apparent U.S. consumption of milled wheat products rose by an average 2.6 percent annually, from 351 million hundredweight in 1992 to 388 million hundredweight in 1996 (table A-2). The import-penetration ratio for milled wheat products rose from 0.3 to 0.8 percent during the period.

Consumption patterns for the other grains varied; consumption of milled oats, starches, and corn starches generally rose, and consumption of malt was flat during the five years (tables A-3 to A-7). Consumption of milled oats rose by 3 percent annually during 1992-96; the import-penetration ratio for milled oats rose sharply from 2 percent in 1992 to 8 percent in 1996 (table A-3). U.S. malt consumption fluctuated between 4.8 million and 4.9 million pounds annually during the 5 years as domestic production remained flat. Imports of malt rose on a quantity basis more than 4-fold and accounted for 2 percent of malt consumption in 1996 (table A-4).

U.S. consumption of starches, the vast majority of which is corn starch, rose by 3 percent during 1992-96 to 8.1 billion pounds in 1996 (table A-5). About 94 percent of U.S. consumption of all starches consisted of corn starch (table A-6). Less than 4 percent of domestic starch consumption was supplied by imports, a ratio little changed during 1992-96.

### ***Conditions of Competition between Foreign and U.S. Milled Grain Products***

The key competitive factors in milled grain trade and production have been price, quality, transportation, and costs of production. Conditions of competition have been generally unfavorable to U.S. wheat flour exports, particularly since 1994/95, according to trade sources.<sup>57</sup> This is reflected in the U.S. share of world flour exports declining from 15 to 9 percent during 1991/92 to 1995/96 (table A-8). As described in the later section "Foreign Market Profile," most world trade in wheat and wheat flour occurs in the form of wheat rather than flour or milled products. In part that happens because of the perishability of flour and difficulties involved in storing and handling it over long distances.

World trade in wheat flour rose to record high levels in 1994/95; however, most of the gains accrued to the EU. World exports of wheat flour rose at a 2 percent annual rate during 1991/92 to 1995/96 (table A-8); the EU accounted for 51 percent of the exports in 1995/96. U.S. exporters of grain and milled grain products have maintained that EU grain sector

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<sup>56</sup> Harwood, Leith, and Heid, *The U.S. Milling and Baking Industries*, p. 4.

<sup>57</sup> "Loss of Export Flour Share an Obvious Blight," *Milling & Baking News*, Dec. 10, 1996, p. 7.

support tended to distort world markets, making competitive conditions difficult.<sup>58</sup> Small, nontraditional wheat flour exporters, particularly Eastern European countries, such as Hungary, also entered the world wheat flour market in 1994/95 and 1995/96, in part induced by high world prices, to supply neighboring Russia, an important flour market.

Another competitive factor for U.S. wheat millers was the North American Free Trade Agreement (NAFTA), with duty-free or reduced-rate entry of milled grain, malts, and starches traded among the United States, Mexico, and Canada.<sup>59</sup> With lower duties and rationalizing of border plants within a single company, Canadian flour has entered the U.S. market in higher volume. As yet, there has been little additional exports of U.S. flour to Canada; similarly, U.S. wheat flour exports to Mexico registered little overall increase during 1992-96.

## Production

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### *Milled Wheat Products*

During 1992-96, U.S. production of milled wheat products rose irregularly by 1.7 percent annually to 396 million hundredweight (table A-2), a post-World War II record. The size and quality of the domestic wheat crop largely dictated the volume of domestic milling activity. The wheat ground for flour followed a pattern similar to that of wheat flour production and rose by 1.5 percent annually during 1992-96 to 882 million bushels (table A-9).

The increased production was made possible by the increased capacity of domestic wheat mills. There was a steady 2.2 percent annual increase in domestic processing capacity of wheat mills during 1992-96, reaching a daily capacity in December 1996 of 1.41 million hundredweight flour equivalent (table A-9). The rate of capacity utilization of the wheat mills in December 1996 was 91 percent of the 6 day capacity rate, up from 87 percent in 1995, and from 85 percent in 1991.<sup>60</sup>

The average flour extraction rate as measured by the number of pounds of wheat required to produce 100 pounds of flour first rose and then dropped during 1992-96 to about 132.4 pounds (table A-9). The higher quality wheat crop (higher protein content) grown during those years tended to lower the amount of wheat needed to produce a hundred-pound sack of flour.

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<sup>58</sup> This is reflected in the 301 trade complaints filed against EU grain programs affecting U.S. grain and grain product exports, as discussed later in this report under "Foreign Trade Measures." In 1996, for example, see Office of the United States Trade Representative (USTR), "Acting USTR Charlene Barshefsky Announces the Signing of Two Major Market Access Agreements with the European Union," press release 96-62, July 25, 1996. This agreement settled a World Trade Organization (WTO) complaint that the United States filed against the EU for failing to implement its Uruguay Round Agreement commitment on grains and milled grain products.

<sup>59</sup> An explanation of NAFTA and other tariff and trade agreement terms is shown in appendix B.

<sup>60</sup> "Total and Per Capita Flour Use Fall in '95, Halting Long Climb," *Milling & Baking News*, March 26, 1996, p. 15; and "Crop Year Flour Output Increases to Recent Level," *Milling & Baking News*, July 15, 1997, p. 9.

Calculated economic returns to milling wheat for bread flour are shown in table A-10 for 1992/93 to 1996/97. This calculated gross margin for producing 100 pounds of flour shows the difference between the cost of wheat and the value of the bread flour and byproduct feedstuff (millfeed). The gross margin was generally above \$2.00 per 100 pounds of flour, with the peak return in 1996/97 of \$2.56. The highest gross return (revenue) was in 1995/96, but higher prices paid for wheat offset the higher revenues received for flour and millfeed. With lower wheat prices in 1996/97, wheat millers were able to raise their net returns despite the lower gross revenues received for flour and millfeed.

### ***Milled Oats***

Total domestic production of milled oats for both feed and food use remained relatively unchanged during 1992-96 at about 1.9 million pounds annually (table A-3). The production of food-grade milled oats is dependent on the availability of raw oats, the planting of which has steadily declined over the past two decades to the lowest level since the Civil War era, according to USDA.<sup>61</sup> The majority of oats grown in the United States are fed to livestock rather than milled for food. Food-grade oats are considerably more valuable on a price per ton basis than feed oats, which compete largely with corn for use in feed rations. The lower plantings of oats and resulting lower output have mainly affected the feed industry, although the lack of domestic milling grade oats did encourage higher imports.

In 1995, a large U.S. oat miller announced a plant closing precipitated by the declining use of oats in feed. However, also in 1995, other domestic oat millers expanded their output of food-grade milled oats to produce defatted oats and defatted oat flour, products enjoying higher use in low-fat foods and breakfast cereals in the United States.<sup>62</sup>

### ***Dry Corn Milling and Other Miscellaneous Grains***

U.S. dry milling of corn increased by 10.5 percent annually from shipments in 1992 of \$776 million to \$1,049 million in 1995, according to data of the U.S. Bureau of the Census. There was an increase in shipments of most types of dry corn milled products, particularly corn flour, during these years. Most of the increase occurred because of higher value added to corn products rather than increased volume. On a volume basis, domestic use of corn in breakfast cereals and other food rose less than 1 percent annually during 1992/93 to 1996/97 to the equivalent of 135 million bushels of corn (table A-7).

Domestic shipments of other grain mill products (rye, oats, and buckwheat) rose from \$82 million to \$173 million during 1987-92, according to the Census Bureau. Slightly over half of the output in 1992 consisted of millfeed rather than food-grade products.

### ***Malt***

U.S. production of barley malt remained constant at about 5.1 billion pounds annually during 1992-96 (table A-4); annual data on the production of other malts and malt extracts are not

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<sup>61</sup> USDA, ERS, *Feed Situation and Outlook*, Nov. 1995, p. 9.

<sup>62</sup> "Oat Mills See Comeback in Health Claim Proposal," *Milling & Baking News*, Jan. 30, 1996, p. 1.

available. There has been little change in domestic production of barley malt since 1980. Total domestic shipments of all types of malt, malt extract, malt byproducts, and related feed products in 1992 amounted to 6.0 billion pounds, valued at \$573 million, according to the U.S. Bureau of the Census (table A-1). In 1995, domestic shipments of malt and malt extract rose to \$676 million.

### *Starches*

U.S. production of starches is estimated to have increased from 7.8 billion to 8.2 billion pounds during 1992-96 (table A-5). Corn starch accounted for 98 percent of domestic starch output, with annual production of potato starch averaging less than 50 million pounds annually, and wheat starch at 350 million pounds annually.

Corn starch production (wet corn milling) rose from 7.5 billion to 7.9 billion pounds during 1992-96, a 1.4 percent annual rise (table A-6). In 1995, the U.S. Census Bureau indicated that the domestic shipments of corn starch amounted to \$1,396 million, a 6 percent rise from the \$1,306 million of starch produced in 1992 (table A-1). Production of corn starch is mainly for industrial uses (as measured by corn inputs), with 85 percent going into industrial uses and 15 percent into food uses (table A-7). In 1996, the price of corn starch rose by 29 percent to nearly \$16 per hundredweight (cwt) from 1995 because of the weather-reduced corn crop and associated high price in 1995/96.<sup>63</sup>

## **U.S. TRADE**

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### **Overview (U.S. Trade Balance)**

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During 1992-95, the positive U.S. trade surplus in milled grains, malts, and starches rose steadily by \$23 million from \$317 million to \$340 million, but then dropped by \$90 million in 1996 to \$250 million (table A-11). Over the 5-year period, the positive trade balance fell by \$67 million. During 1992-96, U.S. exports rose by 9 percent to \$425 million, but U.S. imports rose by 150 percent to \$175 million.

The sharp drop in the positive trade balance was attributable mostly to the 23 percent decline in the value of U.S. exports from 1995 to 1996, as well as to the much higher imports. The export drop in 1996 was a result largely of lower sales of U.S. wheat flour in foreign markets. The volume of U.S. exports of milled grains, malts, and starches declined by 23 percent, in line with the decline in the value of such exports (table A-12).

However, higher imports, particularly from Canada, also contributed to the lower trade surplus. About two-thirds of the increased U.S. imports came from Canada, which registered nearly a 3-fold increase (\$75 million) in its imports of these grain-based products to the United States during the 5 years. Meanwhile, U.S. exports to Canada rose considerably less, by

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<sup>63</sup> The price of bulk, unmodified corn starch (Midwest/West plants) rose irregularly from \$11.03 per cwt in 1992 to \$12.43 per cwt in 1995, and then sharply to \$15.98 per cwt in 1996. USDA, ERS, *Feed Situation and Outlook Yearbook*, March 1997, p. 78.

about three-fourths (\$27 million). U.S. duties on Canadian products have been considerably reduced or eliminated, facilitating U.S. imports. On August 1, 1995, Canada replaced its import licensing on wheat, milled wheat, barley, and barley products with tariff rate quotas (TRQs) that effectively restricted U.S. exports.<sup>64</sup> In September 1997, Canada agreed to suspend its TRQs on U.S. barley and barley-containing products.<sup>65</sup>

Mexico has been an expanding market for U.S. milled wheat, and was the leading single market abroad for U.S. milled grain products during 1992-96 (table A-12). Other expanding markets for U.S. milled grain products are the developing countries and countries of the former Soviet Union (FSU) and of the former Yugoslavia.

## **U.S. Imports**

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### ***Principal Suppliers and Import Levels***

The composition and sources of U.S. imports of milled grains, malts, and starches during 1992-96 are shown in tables A-13 and A-14. About 29 percent of the value of imports in 1996 consisted of starch, another 29 percent of wheat flour and semolina, 13 percent of malt, 11 percent of milled oats (mostly food-grade rolled oats), and 3 percent of corn meal and flour. The remaining products included rice flour, mixed or miscellaneous cereal flours such as barley flour, and tapioca and related starch substitutes.

During 1992-96, U.S. imports of milled grains, malts, and starches more than doubled from \$70 million to \$175 million. A large jump in imports occurred in 1994 when wheat flour imports nearly doubled to \$45 million (table A-13). In that year, the smaller and lower-quality domestic wheat crop increased the demand for Canadian wheat flour that also benefited from the lower U.S. duties on qualifying Canadian products under the U.S.-Canadian Free Trade Agreement. Moreover, the rationalization of U.S. and Canadian mills owned by the same companies resulted in more Canadian flour moving into adjacent U.S. regions than was the case prior to 1994.

Another category of rising imports has been rolled or otherwise milled oats that rose by over 4-fold from \$4 million in 1992 to \$28 million in 1996. U.S. imports of milled oat products rose nearly 3-fold on a quantity basis from 18 million to 74 million kilograms. The buoyant demand for rolled oats and otherwise processed oat products in breakfast cereals and low-fat foods in the United States led to increased imported oats. Stable domestic production of raw oats also shifted demand to foreign oats.

Finally, a third category of imports, malt, rose from \$3 million to \$23 million during 1992-96, a result of increased imports of Canadian and British malt. U.S. imports of malt began to rise in 1993, particularly from Canada; the integration of the U.S.-Canadian FTA eased the importing of Canadian malt, and the Canadian Wheat Board (CWB), which controls the export of Canadian malt and barley, reportedly began to target more sales to the U.S.

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<sup>64</sup> USDA, FAS, *Grain and Feed Annual Report*, April 5, 1996, p. 36.

<sup>65</sup> USTR, "USTR Charlene Barshefsky Announces Agreement With Canada on Barley TRQ," press release 97-83, Sept. 8, 1997.

market.<sup>66</sup> U.S. malt companies also purchased existing Canadian malting companies, thereby integrating production in the two countries' markets.

Canada was the leading U.S. supplier of milled grains, malts, and starches during 1992-96, accounting for 62 percent of the value of U.S. imports (table A-14). EU countries, mostly the Netherlands, United Kingdom, Germany, and Belgium, together supplied about 16 percent of the imports during the 5 years and were followed by Thailand with an 8 percent share.

Canada has supplied chiefly wheat flour and barley malt to the United States during 1992-96. U.S. imports of milled grains, malts, and starches from Canada have risen nearly 2-fold during 1992-96 to \$109 million. The reduced rates of U.S. duty under the U.S.-Canadian FTA, now under NAFTA, and increased integration of North American flour mill and malting company operations may have contributed to the rising Canadian shipments.

The EU countries have supplied chiefly milled oat products, potato starch, and malt to the United States; U.S. imports from the EU rose from \$19 million to \$32 million, during 1992-96 (table A-11). Meanwhile, Thailand supplied \$14 million of products in 1996 (chiefly cassava or tapioca products); Thailand is the leading world exporter of cassava and tapioca products.

## ***U.S. Trade Measures***

***Tariff and nontariff measures.***—Table A-15 shows the column 1 rates of duty, as of January 1, 1997, for the articles included in this summary (including both general and special rates of duty) and for U.S. exports and imports for 1996. The aggregate trade-weighted average rate of duty for all products covered in this summary, based on 1996 imports, was 0.8 percent ad valorem equivalent; the average trade-weighted rate of duty for the dutiable products was 1.1 percent ad valorem equivalent. About 30 percent of the \$175 million of imports included here were duty-free in 1996. On January 1, 1994, the United States, Canada, and Mexico implemented the North American Free Trade Agreement (NAFTA).<sup>67</sup> There were no identified significant nontariff measures (NTMs) or health and sanitary regulations that affect U.S. imports of milled grains, malts, and starches in place at yearend 1997.

***U.S. Government trade-related investigations.***—In 1994, at the request of the President the Commission conducted an investigation under section 22(a) of the Agriculture Adjustment Act (7 U.S.C. 624(a)) to determine whether wheat classified in HTS heading 1001, wheat flour classified in HTS heading 1101, and semolina classified in HTS subheading 1103.1100 are being or are practically certain to be imported into the United States under such conditions and in such quantities as to materially interfere with the price support, payment, and production adjustment program conducted by USDA.<sup>68</sup> The Commission reported its findings to the President in July 1994. Subsequently, the President imposed tariff-rate quotas on all wheat imports into the United States from September 1994 through September 1995.

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<sup>66</sup> See for a discussion, Johnson and Wilson, *North American Barley Trade and Competition*, Feb. 1994.

<sup>67</sup> For additional information, see USITC, *Potential Impact on the U.S. Economy and Selected Industries of the North American Free-Trade Agreement*, USITC Publication 2596, Jan. 1993, chapter 23.

<sup>68</sup> USITC, *Wheat, Wheat Flour, and Semolina* (investigation No. 22-54), July 1994.

On September 26, 1997, on behalf of the Wheat Gluten Industry Council, the Commission instituted an investigation under section 202 of the Trade Act of 1974 (19 U.S.C. 2252), to determine whether wheat gluten, provided for in HTS subheadings 1109.00.10 and 1109.00.90, is being imported into the United States in such increased quantities as to be a substantial cause of serious injury, or the threat thereof, to the domestic industry producing an article like or directly competitive with the imported article.<sup>69</sup>

On January 15, 1998, the Commission determined that increased imports of wheat gluten are a substantial cause of serious injury to the U.S. wheat gluten industry. Under section 311 of the NAFTA, the Commission made a negative finding with respect to imports of wheat gluten from Canada and Mexico.

On March 11, 1998, the Commission recommended that the President impose a quota on imports of wheat gluten for a four-year period. The quota would be set in the first year at 126 million pounds, with this amount increasing by 6 percent in each of the three following years. The Commission also recommended that the President allocate, within that quota, separate quotas for the European Union, Australia, and all other non-excluded countries, taking into account the disproportional growth and the impact of imports of wheat gluten from the European Union. It further recommended that any imports of wheat gluten from Canada, Mexico, Israel, and the beneficiary countries under the Caribbean Basin Economic Recovery Act or the Andean Trade Preferences Act be excluded from the quota, and that the President undertake international negotiations to address the underlying cause of the increase in imports of wheat gluten or otherwise to alleviate the injury to the domestic industry.

The Commission forwarded its findings and recommendations to the President. The President, not the Commission, makes the final decision whether to provide relief to the U.S. industry and the type and amount of relief.

Wheat gluten is a co-product of the production of wheat starch; wheat gluten is not covered in this summary.<sup>70</sup>

## **U.S. Exports**

### ***Principal Markets and Export Levels***

During 1992-96, foreign markets purchased an average 5 percent of U.S. production of milled wheat products, 6 percent of U.S. production of malt, and 3 percent of U.S. production of starches (tables A-2, 4, and 5). In 1996, the composition of U.S. exports of milled grains, malts, and starches consisted mainly of wheat flour (34 percent of the value), corn meal and flour (26 percent), starch (18 percent), and malt (11 percent) (table A-16).

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<sup>69</sup> USITC, Wheat Gluten, (Investigation No. TA-201-67), Sept. 26, 1997.

<sup>70</sup> Wheat gluten is covered under the USITC *Industry and Trade Summary on Animal Feeds* (forthcoming).

During 1992-95, U.S. exports of milled wheat, malt, and starches rose steadily from \$387 million to \$491 million and then dropped to \$425 million in 1996 (tables A-12 and 16). On a volume basis, exports followed a similar pattern, peaking at 1.9 million metric tons in 1995 and then dropping to 1.3 MT in 1996.

The principal destinations for U.S. exports of milled grains, malts, and starches have been Mexico, Canada, Haiti, Japan, and Bosnia-Herzegovina (together purchasing 51 percent of 1996 exports), although a large number of countries have purchased smaller amounts over the past 5 years (table A-12). About 56 percent of the \$145 million of U.S. wheat flour exports in 1996 went to Haiti, Bosnia-Herzegovina, Mexico, and Peru, all of which except Mexico receive either P.L. 480 humanitarian or other USDA export assistance (table A-17).

The reversal in levels of U.S. flour exports in 1996 followed the withdrawal of U.S. export assistance through the Export Enhancement Program and other programs of the USDA in 1995-96. At the same time, sharply higher U.S. flour prices made U.S. exports uncompetitive in foreign markets with EU flour. EU flour also benefited from wheat prices within the EU that were lower than world or U.S. wheat prices.<sup>71</sup>

U.S. malt exports have gone mainly to Mexico, Japan, South Africa, and the Philippines, which together purchased about 80 percent of the \$45 million of 1996 exports (table A-18). Meanwhile, 60 percent of 1996 U.S. starch exports went to Canada, Japan, Mexico, and the EU (table A-19).

U.S. Government export assistance and credit guarantees have been key factors in U.S. exports of milled grain products and malt, and the loss of those programs curtailed U.S. flour exports beginning in 1996. The availability of EU wheat flour that receives export subsidies or benefits from internal wheat prices below prevailing world prices has distorted world markets for wheat flour. The emergence of Eastern European flour exporters since 1993 also raised competitiveness in the world flour market. Historically, a large number of U.S. wheat flour markets such as Yemen, Haiti, Bosnia-Herzegovina, Peru, and Liberia were granted humanitarian or development aid assistance from the United States, and this assistance has typically been granted in-kind in the form of wheat flour. Declining U.S. foreign aid has reduced U.S. wheat flour shipments to eligible recipient countries.

### ***Foreign Trade Measures***

U.S. exports of milled grain, malts, and starches go largely to developing countries, although some are sold in Canada and the European Union as well. Mexico, Canada, Haiti, Japan, Bosnia-Herzegovina, the United Kingdom, the Dominican Republic, Peru, South Africa, and the Netherlands were the 10 leading markets for these products, together purchasing about 65 percent of the \$425 million of U.S. exports in 1996 (table A-12).

Most wheat importing and wheat producing countries provide substantial tariff protection for their wheat milling industries. Until recent years, many wheat importing countries had state buying agencies or flour millers associations with import monopoly powers, and often

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<sup>71</sup> See "Loss of Export Flour Share an Obvious Blight," *Milling & Baking News*, Dec. 10, 1996, p. 7.



domestic flour prices were fixed.<sup>72</sup> With the Uruguay Round Agreements (URA) in 1994, and the reduction in many countries of agriculture support programs, many wheat importing countries have reduced their import control and marketing systems and have allowed more market-driven decisions.

Canada, somewhat of an exception to this situation, has steadily reduced its duties on U.S. exports of these products and is scheduled to eliminate such duties on qualifying U.S. exports on January 1, 1998.<sup>73</sup> However, despite the U.S.-CFTA and NAFTA, Canada imposed tariff rate quotas (TRQs) in 1995 that restricted U.S. exports of wheat, milled wheat, barley, and barley products.<sup>74</sup> In 1997, Canada did lift the TRQs affecting U.S. barley and barley-containing products.<sup>75</sup> Prior to 1995, Canada used import licensing to restrict imports of wheat, milled wheat, barley, and barley products.<sup>76</sup>

Mexico imposed tariffs in 1997 ranging from 7 to 11 percent on U.S. milled grain, starches, and malt; Mexico is scheduled to reduce these tariffs to free by the year 2003. Mexico imposed a 154 percent AVE tariff (or U.S. \$0.186/kilogram) on U.S. malt in 1996; this tariff will be reduced to 33.2 percent AVE (or U.S. \$0.04/kilogram) in the year 2003.<sup>77</sup>

The leading nontariff measure in world milled wheat markets has historically been the operation of the EU export subsidy program "export restitutions," given the EU position as leading flour exporter. The United States has filed several complaints under section 301 of the Trade Act of 1974 against the EU wheat flour and other wheat product exports.<sup>78</sup> In early 1997, USTR initiated a 301 investigation of EU subsidy practices affecting U.S. modified starch exports (derived from grain) to Europe.<sup>79</sup>

As part of the Uruguay Round Agreements, the EU had agreed to reduce the amount of its export subsidies for wheat and other agricultural products. In July 1995, the United States brought to the WTO a dispute concerning the EU implementation of its market access concessions on grains; in July 1996, USTR announced a Grains Agreement with the EU that eliminated the basis for the market access complaint, and provided for bilateral consultations on U.S. wheat gluten imports from the EU, "should there be a surge in these imports."<sup>80</sup>

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<sup>72</sup> Dennis Stephens, "Changing Global Attitudes on Wheat Quality, World Grain", Aug. 1997, p. 24.

<sup>73</sup> *North American Free Trade Agreement, Annex 302.2, Schedule of Canada, and Schedule of Mexico.*

<sup>74</sup> USDA, FAS, *Grain and Feed Annual Report*, April 5, 1996, p. 36.

<sup>75</sup> USTR, "USTR Charlene Barshefsky Announces Agreement With Canada on Barley TRQ," press release 97-83, Sept. 8, 1997.

<sup>76</sup> Johnson and Wilson, *North American Barley Trade and Competition*, Feb. 1994, pp. 1-8.

<sup>77</sup> Mexico also imposes a tariff-rate quota on imports of U.S. barley and malt exceeding 139,000 metric tons in 1997; this in-quota amount rises by 5 percent annually.

<sup>78</sup> Section 301 of the Trade Act of 1974, as amended, authorizes the United States to respond to unfair trade practices of foreign countries; at least two 301 complaints on EU wheat flour and pasta have been filed. Congressional Research Service, *Addressing Unfair Trade: Agricultural Cases under Section 301*, Sept. 11, 1989.

<sup>79</sup> USTR, "USTR Initiates 301 Investigation of European Union Subsidy Practices," press release 97-18, March 10, 1997.

<sup>80</sup> USTR, "Acting USTR Charlene Barshefsky Announces the Signing of Two Major Market Access Agreements with the European Union," press release 96-62, July 25, 1996.

# FOREIGN INDUSTRY PROFILE

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## Foreign Market Profile

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Most grain is consumed and grown in the same region or country, so that world trade of grain represents only a fraction of consumption. For example, in 1996/97 world grain trade accounted for about 11 percent of world grain consumption.<sup>81</sup> However, many countries depend on grain or milled grain imports for a sizable proportion of their domestic consumption or for supply in years of crop failure. Moreover, with economic development and rising per capita incomes in many lower-or middle-income countries of the world, the world demand for grain and milled grain products has been increasing sharply. This has occurred because of consumer demand for traditional wheat products, such as bread or pasta, and for meat that requires sizable feed grains.

Nevertheless, most trade in grain and grain products occurs in the form of unprocessed grain rather than as processed grain products, such as wheat flour or corn flour. In 1995/96, merely 9 percent of total world exports of wheat and wheat flour consisted of wheat flour, the other 91 percent being wheat, according to data of the International Grains Council.<sup>82</sup>

Imports of wheat flour into the leading world markets are shown in table A-20. Of the nine leading markets for wheat flour, six are North African or Middle Eastern countries, the leader being Algeria. The FSU became a sizable wheat flour importer in 1990/91 and the leading market in 1995/96. Many of these import markets have received concessional export assistance either from the United States or the EU to purchase wheat flour.

World trade in malts and starches differs considerably from the milled grain products. Malt is used almost exclusively by breweries and, therefore, is purchased by countries with sizable beer production. Leading world markets for malt in recent years have been Mexico, the EU, Japan, the Philippines, Brazil, and Australia. Starch trade occurs mainly among the developed countries with sizable food processing or industrial uses of starch.

## Major World Producers

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The United States is the leading producer of corn and the third leading wheat producer in the world, behind China and India. However, because China and India are either net importers or negligible exporters of wheat, the United States is by far the leading exporter of wheat and the second leading wheat flour exporter. The vast majority of world trade in wheat and wheat flour occurs in the form of wheat rather than flour since most countries have milling industries that process the wheat internally. In 1995/96, world wheat flour trade accounted for 1.6 percent of world consumption of wheat of 550 million metric tons (MT). In that year, wheat

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<sup>81</sup> In 1996/97, world trade in grain of 204 MT represented about 11 percent of world consumption of 1,794 MT, according to data of the USDA, *Grain: World Markets and Trade*, Sept. 1997, p. 6.

<sup>82</sup> International Grains Council, fax transmission, Jan. 1, 1997.

flour accounted for 9 percent of total world exports of the 96 MT of both wheat and wheat flour.<sup>83</sup>

The ten leading flour producers in the world supplied nearly 153 million metric tons of wheat flour in 1992 (the latest year for which data are available), according to the International Grains Council (figure 3). China, the FSU, the EU, and the United States were the four leading producers, accounting for 85 percent of this total. However, of these ten leading producers of wheat flour, only the EU, the United States, and Argentina were net exporters of wheat and wheat flour, the others being dependent on wheat imports for milling into flour.

As to corn starch and milled corn products, the United States corn processing capacity accounts for most of the world's wet corn milling capacity, followed in turn by the EU. Dry corn milling industries exist in many countries of the world, particularly where corn meal is a leading food, such as Mexico, and South America.

With regard to the world malt markets and producers, malt is largely produced in countries that have access to domestic supplies of malting barley. In 1997, world malt capacity was estimated at 19.5 million metric tons, with 51 percent located in Europe, 21 percent in North America (mostly the United States and Canada), 6 percent in South America, and 4 percent in Australia.<sup>84</sup> The United States is the largest malt producer in the world, paralleling its position as the world's leading beer producer. However, the United States utilizes most of its output domestically and is a relatively small net exporter of malt (importing malt as well).

## **World Producers' Involvement in Export Markets**

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During 1991/92 to 1995/96, the EU was the dominant exporter, with a 56 percent share of average wheat flour exports (figure 4). The United States was the second leading wheat flour exporter during these 5 years with a 15 percent share. Turkey, Japan, and Argentina were the only other wheat flour exporters of note, together having a 17 percent share of world wheat flour exports during the 5 years (figure 4). In 1995/96, Turkey surpassed the United States as the second leading wheat flour exporter as U.S. exports dropped nearly in half from the previous year for reasons discussed earlier (table A-8).

Four of the seven leading malt exporters in the world are EU countries (led by France, Belgium, and Germany), followed by Canada, Australia, and the Czech Republic. The EU alone accounted for over half of world exports of malt in 1995, according to an industry estimate.<sup>85</sup> The United States is a relatively small net malt exporter.

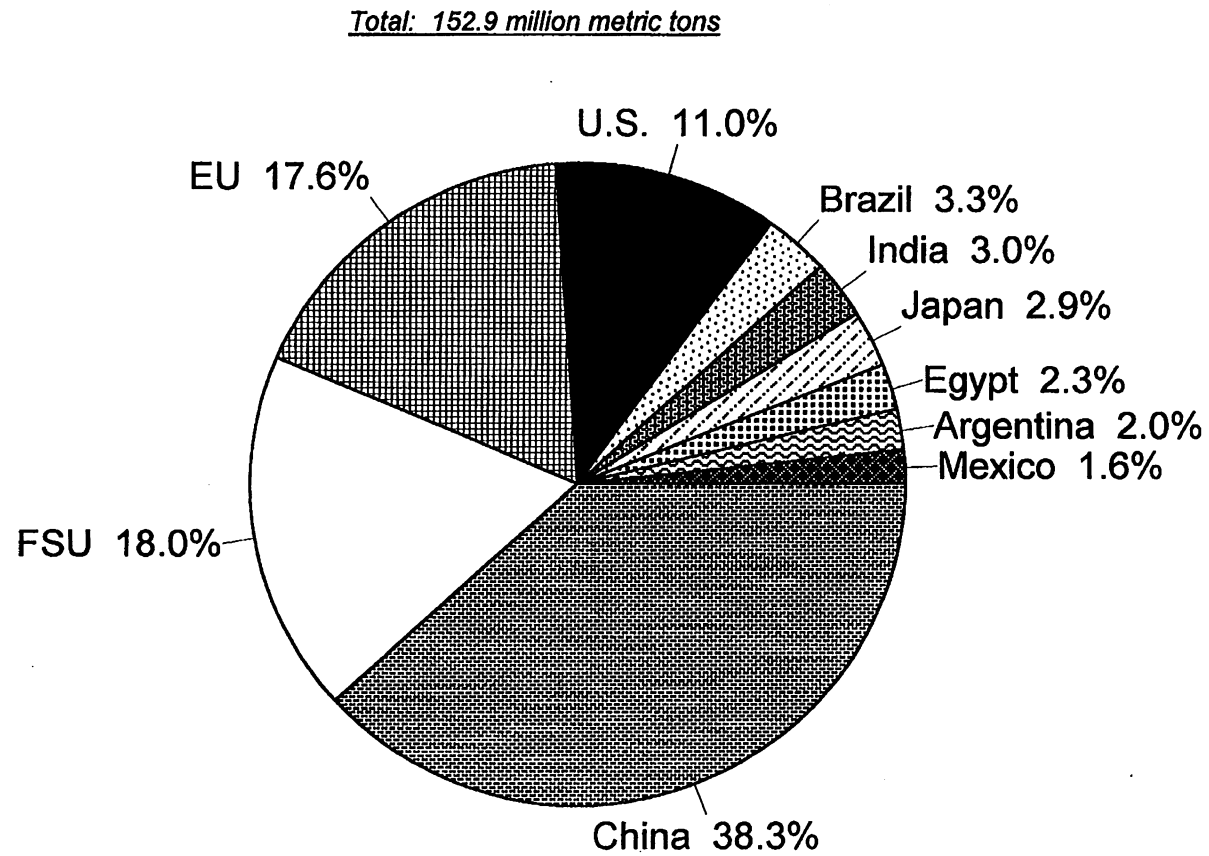
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<sup>83</sup> International Grains Council, and USDA.

<sup>84</sup> David Wilkes, "The World Malt Market," *World Grain*, Oct. 1997, p. 7.

<sup>85</sup> Wilkes, *Ibid.*, p. 8.

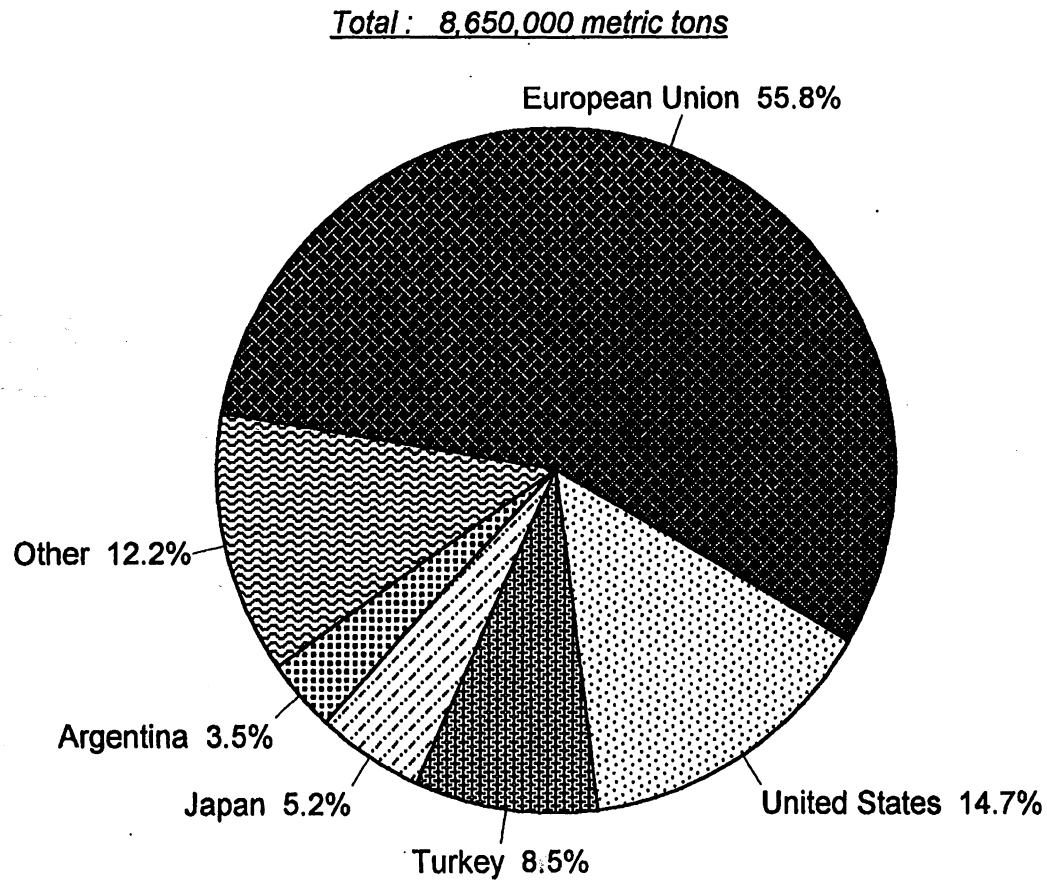
Figure 3  
Wheat flour: World production of the 10-leading producers, 1992



Source: Data compiled from the International Grains Council, except for China which are compiled from data of the U.S. Department of Agriculture.

Figure 4

Wheat flour: World exports, by leading suppliers, 5-year average, crop years 1991/92 to 1995/96



Source: Data compiled from the International Grains Council. Data include pasta for the EU and Japan.



**APPENDIX A**  
**STATISTICAL TABLES**

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**Table A-1**  
**Milled grains, malts, and starches: Selected U.S. industrial statistics, by principal industrial groups, 1987, 1992, and 1995**

Year	Companies	Establishments:		Employees:		Shipments:		
		Total	With 20 employees or more	Total	Production	Value-added by manufacture	Milled grains, malts, and starches	All products
		(No.)		(1,000)		(\$1 million)		
<b>Flour and other grain milled products (SIC 2041)</b>								
1987 . . . .	237	358	165	13.3	9.9	1,336.7	4,608.3	4,984.8
1992 . . . .	230	365	172	13.1	9.5	1,624.5	5,955.8	6,194.4
1995 . . . .	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	13.0	9.3	1,968.8	6,917.2	7,390.7
<b>Rice milling (SIC 2044)</b>								
1987 . . . .	48	63	35	4.5	3.5	469.6	65.0 <sup>1</sup>	1,234.9
1992 . . . .	44	53	33	3.9	3.1	437.0	92.1 <sup>1</sup>	1,650.7
1995 . . . .	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	4.0	3.1	477.1	100.0 <sup>4</sup>	1,890.4
<b>Wet corn milling (SIC 2046)</b>								
1987 . . . .	31	60	35	8.6	5.9	2,074.5	774.3	4,788.9
1992 . . . .	28	51	34	9.2	6.1	3,257.5	1,305.6	7,045.2
1995 . . . .	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	9.2	6.2	4,071.1	1,395.6	7,520.7
<b>Malt (SIC 2083)</b>								
1987 . . . .	15	27	19	1.4	1.1	153.6	534.3 <sup>2</sup>	534.3
1992 . . . .	16	26	18	1.3	.9	175.9	573.3 <sup>2</sup>	573.3
1995 . . . .	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	1.2	.9	212.7	676.3 <sup>2</sup>	676.3
<b>Total all milled grains, malts, and starches</b>								
1987 . . . .	331	508	254	27.8	20.4	4,034.4	5,981.9	11,542.9
1992 . . . .	318	495	257	27.5	19.6	5,494.9	7,926.8	15,463.6
1995 . . . .	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	27.4	19.5	6,729.7	9,089.1	17,478.1

<sup>1</sup> Includes other rice by products.

<sup>2</sup> Includes other products.

<sup>3</sup> Not available.

<sup>4</sup> USITC staff estimate.

Source: U.S. Department of Commerce, Bureau of the Census, 1992 *Census of Manufacturers* and Annual Survey of Manufactures, 1995.



**Table A-2**

**Milled wheat products fit for human consumption: U.S. production, exports of domestic merchandise, imports for consumption, and apparent consumption, 1992-96**

Year	Production	Exports <sup>1</sup>	Imports <sup>1</sup>	Consumption	Ratio of	Ratio of
					imports to	exports to
					consumption	production
					Percent	
<i>1,000 hundredweight</i>						
1992	370,829	21,088	1,125	350,866	0.3	5.7
1993	387,419	23,404	1,787	365,802	0.5	6.0
1994	392,519	24,422	3,494	371,591	0.9	6.2
1995	386,689	24,073	3,359	365,975	0.9	6.2
1996	396,176	11,036	2,931	388,071	0.8	2.8

<sup>1</sup> Includes only those classified under HTS chapter 11.

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table A-3**

**Milled oats: U.S. production, exports of domestic merchandise, imports for consumption, and apparent consumption, 1992-96**

Year	Production <sup>1</sup>	Exports <sup>2</sup>	Imports <sup>2</sup>	Apparent consumption	Ratio (percent)
					of imports to consumption
<i>Quantity (In millions of pounds)</i>					
1992	1,824	24	40	1,840	2
1993	1,856	18	84	1,922	4
1994	1,888	20	142	2,010	7
1995	1,920	30	115	2,005	6
1996	1,952	15	164	2,084	8
<i>Value (In thousands of dollars)</i>					
1992	( <sup>3</sup> )	8,870	5,226	( <sup>3</sup> )	( <sup>3</sup> )
1993	( <sup>3</sup> )	8,380	9,781	( <sup>3</sup> )	( <sup>3</sup> )
1994	( <sup>3</sup> )	10,741	15,281	( <sup>3</sup> )	( <sup>3</sup> )
1995	( <sup>3</sup> )	12,171	15,458	( <sup>3</sup> )	( <sup>3</sup> )
1996	( <sup>3</sup> )	7,689	28,292	( <sup>3</sup> )	( <sup>3</sup> )
<i>Unit Value (In cents per pound)</i>					
1992	—	37	13	—	—
1993	—	47	12	—	—
1994	—	54	11	—	—
1995	—	41	13	—	—
1996	—	24	17	—	—

<sup>1</sup> Commission staff estimate based on reported USDA data for oats used in food, alcohol, and industrial uses, converted on the basis of 1 bushel equals 32 pounds.

<sup>2</sup> Includes all milled oat products classified under HTS chapter 11.

<sup>3</sup> Not available.

Source: Production, Commission staff estimates; imports and exports compiled from official statistics of the U.S. Department of Commerce.

Table A-4

**Malt: U.S. production, exports of domestic merchandise, imports for consumption, and apparent consumption, 1992-96**

Year	Production <sup>1</sup>	Exports <sup>2</sup>	Imports <sup>2</sup>	Apparent consumption	Ratio (percent)
					of imports to consumption
<i>Quantity (In millions of pounds)</i>					<i>Percent</i>
1992 .....	5,086	278	22	4,830	.5
1993 .....	5,147	406	69	4,810	1.4
1994 .....	5,114	263	99	4,950	2.0
1995 .....	5,080	359	109	4,830	2.3
1996 .....	5,025	278	113	4,860	2.3
<i>Value (In millions of dollars)</i>					
1992 .....	( <sup>3</sup> )	34	3	( <sup>3</sup> )	( <sup>3</sup> )
1993 .....	( <sup>3</sup> )	51	8	( <sup>3</sup> )	( <sup>3</sup> )
1994 .....	( <sup>3</sup> )	30	13	( <sup>3</sup> )	( <sup>3</sup> )
1995 .....	( <sup>3</sup> )	42	19	( <sup>3</sup> )	( <sup>3</sup> )
1996 .....	( <sup>3</sup> )	45	23	( <sup>3</sup> )	( <sup>3</sup> )
<i>Unit Value (In cents per pound)</i>					
1992 .....	—	12	14	—	—
1993 .....	—	13	12	—	—
1994 .....	—	11	13	—	—
1995 .....	—	12	17	—	—
1996 .....	—	16	20	—	—

<sup>1</sup> Commission staff estimates based on the reported use of barley in the manufacture of alcoholic beverages and malt beginning September. Quantity calculated assuming a yield of 34 pounds of malt per bushel of barley.

<sup>2</sup> Includes all types of malt.

<sup>3</sup> Not available.

Source: Apparent consumption, computed from official statistics of the U.S. Department of the Treasury; imports and exports, compiled from official statistics of the U.S. Department of Commerce; production is derived.

Table A-5

## Starches: U.S. production, exports of domestic merchandise, imports for consumption, and apparent consumption, 1992-96

Year	Production <sup>1</sup>	Exports	Imports	Apparent consumption	Ratio (percent)
					of imports to consumption
					Percent
<i>Quantity (In millions of pounds)</i>					
1992 .....	7,800	169	237	7,868	3.0
1993 .....	8,000	163	288	8,125	3.5
1994 .....	7,800	214	283	7,869	3.6
1995 .....	8,000	324	280	7,956	3.5
1996 .....	8,200	347	282	8,135	3.5
<i>Value (In millions of dollars)</i>					
1992 .....	( <sup>2</sup> )	48,073	34,661	( <sup>2</sup> )	( <sup>2</sup> )
1993 .....	( <sup>2</sup> )	48,173	39,709	( <sup>2</sup> )	( <sup>2</sup> )
1994 .....	( <sup>2</sup> )	60,131	39,947	( <sup>2</sup> )	( <sup>2</sup> )
1995 .....	( <sup>2</sup> )	73,537	46,686	( <sup>2</sup> )	( <sup>2</sup> )
1996 .....	( <sup>2</sup> )	78,033	50,790	( <sup>2</sup> )	( <sup>2</sup> )
<i>Unit Value (In cents per pound)</i>					
1992 .....	( <sup>2</sup> )	28	15	—	—
1993 .....	( <sup>2</sup> )	30	14	—	—
1994 .....	( <sup>2</sup> )	28	14	—	—
1995 .....	( <sup>2</sup> )	23	17	—	—
1996 .....	( <sup>2</sup> )	24	18	—	—

<sup>1</sup> Estimated on the basis of corn grind by wet millers, potatoes used for starch and flour, and wheat gluten production.

<sup>2</sup> Not available.

Source: Production, estimated by the staff of the U.S. International Trade Commission; export and imports, compiled from official statistics of the U.S. Department of Commerce.

**Table A-6****Corn starches: U.S. production, exports of domestic merchandise, imports for consumption, and apparent consumption, 1992-96**

Year	Production <sup>1</sup>	Exports	Imports	Apparent consumption	Ratio (percent)
					of imports to consumption
					Percent
<i>Million pounds</i>					
1992	7,499	131	91	7,459	1.2
1993	7,671	128	103	7,646	1.3
1994	7,534	148	116	7,502	1.5
1995	7,740	2,254	111	7,627	1.5
1996	7,912	230	115	7,797	1.5

<sup>1</sup> Estimated, assuming that 1 bushel of corn yields 34.4 pounds of starch (10 percent moisture starch from 17 percent moisture corn). Production data are on a marketing-year basis, beginning September 1 in the year shown.

Source: Derived from table A-10 (computed from official statistics of the U.S. Department of Agriculture); imports and exports, compiled from official statistics of the U.S. Department of Commerce.

**Table A-7****Corn: Use of corn in food and industrial products in the United States, marketing years 1992/93 to 1996/97**

<i>(In millions of bushels)</i>									
Marketing year beginning Sept. 1	High-fructose corn syrup (HFCS) <sup>1</sup>	Glucose and dextrine <sup>2</sup>	Breakfast cereal and other food <sup>3</sup>	Starch in food <sup>3</sup>	Starch in industrial uses	Alcohol for beverages	Alcohol for fuel	Total	
1992/93	414	215	129	33	185	136	426	1,538	
1993/94	442	223	131	33	190	110	458	1,587	
1994/95	462	231	132	34	192	100	533	1,686	
1995/96	482	240	133	33	186	125	396	1,592	
1996/97 <sup>4</sup>	505	240	135	34	191	110	435	1,650	

<sup>1</sup> Includes corn reported as "residual."

<sup>2</sup> Used primarily in food.

<sup>3</sup> Starch use allocated as 85 percent to industrial and 15 percent to food use.

<sup>4</sup> Forecast.

Source: USDA, ERS, *Feed Situation and Outlook Yearbook*, March 1997, p. 17, and *Feed Outlook*, Aug. 13, 1997, table 6.

**Table A-8****Wheat flour: World exports, by leading suppliers, crop years 1991/92 to 95/96 (1,000 metric tons in wheat equivalents)**

Country/region	Crop year beg. July —				
	1991/92	1992/93	1993/94	1994/95	1995/96
European Union <sup>1</sup>	4,806	4,893	5,053	4,970	4,589
United States	1,230	1,499	1,239	1,652	790
Turkey	943	523	598	784	870
Japan	412	432	423	453	560
Argentina	( <sup>2</sup> )	245	240	458	267
All other	822	549	670	1,391	1,886
Total	8,213	8,141	8,223	9,708	8,963

<sup>1</sup> Excludes intra-EU trade.

<sup>2</sup> Included under "all other."

Source: International Grains Council, *World Grain Statistics*, various issues.

**Table A-9**

**Milled wheat: U.S. wheat milling industry, selected production indicators, 1992-96**

Year	Wheat ground for flour (1,000 bushels)	Wheat flour production (1,000 cwt)	December daily 24-hour capacity (1,000 cwt)	Average pounds per cwt sack of flour products	
				Wheat	Millfeed
				(Pounds)	
1992 .....	833,339	370,829	1,294	134.8	36.2
1993 .....	871,408	387,419	1,370	135.0	35.9
1994 .....	884,707	395,519	1,380	135.2	36.6
1995 .....	869,296	388,689	1,413	134.2	36.8
1996 .....	881,526	396,176	1,409	132.4	35.4

Source: U.S. Department of Commerce, Bureau of the Census, *M20A Flour Milling*, various issues.

**Table A-10**

**Wheat and wheat flour: Kansas City mill prices and operating gross margin, crop years 1992/1993 to 1996/97**

Item	1992/93	1993/94	1994/95	1995/96	1996/97 <sup>1</sup>
At Kansas City mills:					
Cost of wheat to produce 100 lbs. flour <sup>2</sup> .....	\$8.53	\$10.03	\$9.25	\$12.97	\$11.19
Wholesale price of:					
Bakery flour/100 lbs. <sup>3</sup> .....	9.65	10.34	10.50	13.35	11.72
Byproducts obtained from 100 lbs. flour <sup>4</sup> .....	1.28	1.46	1.21	1.93	2.03
Total value .....	10.93	11.79	11.71	15.28	13.75
Margin between cost of wheat and total value	2.40	1.77	2.46	2.31	2.56

<sup>1</sup> Preliminary; June - January only.

<sup>2</sup> Based on 73 percent extraction rate, cost of 2.28 bushels: At Kansas City, No. 1 Hard Winter, 13 percent protein.

<sup>3</sup> Quoted as 95 percent mid-month bakers' flour at Kansas City.

<sup>4</sup> Assumed 50-50 millfeed distribution between bran and shorts or middlings, bulk basis.

Note.—Crop year begins June 1.

Source: USDA, ERS, *Wheat Situation and Outlook Report*, July 1994 and March 1997.

Table A-11

## Milled grain, malts, and starches: U.S. exports, imports, and merchandise trade balance, by selected countries and country groups, 1992-96

Source	1992	1993	1994	1995	1996
	<i>(Million dollars)</i>				
U.S. export of domestic merchandise:					
Canada .....	36	40	50	45	64
Thailand .....	( <sup>2</sup> )	1	( <sup>2</sup> )	( <sup>2</sup> )	2
Netherlands .....	1	4	7	8	8
United Kingdom .....	14	23	12	11	10
Germany .....	7	4	2	2	2
Mexico .....	65	66	64	42	80
Venezuela .....	3	3	1	4	2
Belgium .....	1	( <sup>2</sup> )	1	( <sup>2</sup> )	1
Denmark .....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	1
China .....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	1	1
All other .....	260	302	327	378	255
Total .....	387	445	464	491	425
EU-12 .....	26	36	24	24	24
U.S. import for consumption:					
Canada .....	35	58	93	93	109
Thailand .....	8	9	7	13	14
Netherlands .....	8	9	7	9	9
United Kingdom .....	1	2	5	8	8
Germany .....	3	4	4	7	7
Mexico .....	2	3	3	5	4
Venezuela .....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	1	4
Belgium .....	1	1	2	3	4
Denmark .....	4	3	2	2	3
China .....	1	( <sup>2</sup> )	1	1	2
All other .....	7	7	8	10	10
Total .....	70	96	132	151	175
EU-12 .....	19	20	21	30	32
U.S. merchandise trade balance:					
Canada .....	1	-18	-43	-48	-45
Thailand .....	-8	-8	-7	-13	-12
Netherlands .....	-7	-5	( <sup>2</sup> )	-1	-1
United Kingdom .....	13	21	7	3	2
Germany .....	4	( <sup>2</sup> )	-2	-5	-5
Mexico .....	63	63	61	37	76
Venezuela .....	3	3	1	3	-2
Belgium .....	( <sup>2</sup> )	-1	-2	-3	-3
Denmark .....	-4	-3	-2	-2	-2
China .....	-1	( <sup>2</sup> )	-1	( <sup>2</sup> )	-1
All other .....	253	295	319	368	245
Total .....	317	349	332	340	250
EU-12 .....	7	16	3	-6	-8

<sup>1</sup> Imports are customs value; exports are f.a.s. value, U.S. port of export.

<sup>2</sup> Less than \$500,000.

Note.—Totals may not add to the totals shown because of rounding.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table A-12

## Milled grain, malts, and starches: U.S. exports of domestic merchandise, by leading markets, 1992-96

Source	1992	1993	1994	1995	1996
	<i>1,000 (Kilograms)</i>				
Mexico . . . . .	274,831	295,436	253,937	150,296	234,280
Canada . . . . .	137,459	148,505	183,778	148,200	194,216
Haiti . . . . .	184,667	160,934	109,098	143,803	153,767
Japan . . . . .	35,622	57,830	78,630	70,386	59,987
Bosnia-Herzegovina . . . . .	0	4,409	98,001	66,447	47,900
United Kingdom . . . . .	33,538	65,483	31,556	23,336	18,988
Dominican Republic . . . . .	24,661	23,559	29,670	45,797	24,814
Peru . . . . .	94,529	70,333	60,537	57,120	32,851
South Africa . . . . .	579	1,742	3,551	14,056	21,857
Netherlands . . . . .	3,467	10,336	17,825	17,825	16,783
All other . . . . .	836,944	1,035,597	1,005,003	1,180,118	456,001
Total . . . . .	1,626,298	1,874,167	1,921,587	1,917,385	1,258,444
	<i>(Thousands of dollars)</i>				
Mexico . . . . .	65,073	65,711	63,703	41,811	80,449
Canada . . . . .	36,119	39,819	49,748	44,877	63,611
Haiti . . . . .	46,447	40,332	29,273	37,536	47,176
Japan . . . . .	15,262	25,077	35,421	22,381	24,797
Bosnia-Herzegovina . . . . .	0	1,099	22,533	18,335	14,761
United Kingdom . . . . .	13,645	23,488	11,957	11,419	10,053
Dominican Republic . . . . .	7,587	7,195	9,328	15,863	9,251
Peru . . . . .	19,173	15,971	14,173	15,288	9,767
South Africa . . . . .	381	900	2,412	4,652	9,170
Netherlands . . . . .	1,425	3,846	6,665	7,931	8,159
All other . . . . .	181,890	221,246	219,039	11,419	147,502
Total . . . . .	387,002	444,684	464,251	491,146	424,745

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table A-13

## Milled grains, malts, and starches: U.S. imports for consumption, by principal types, 1992-

96

Type	1992	1993	1994	1995	1996
	<i>Quantity (1,000 metric tons)</i>				
Wheat flour:					
Hard spring .....	0.7	16.2	65.8	77.2	45.9
Durum .....	3.7	8.6	11.9	13.1	12.7
White winter .....	11.7	.6	1.2	.8	.3
Other .....	29.6	55.0	72.6	60.5	73.4
	45.7	80.4	151.5	151.6	132.3
Subtotal .....					
Rye flour .....	.1	0	.1	.2	.1
Corn flour .....	2.8	2.7	5.3	13.8	8.8
Rice flour .....	3.0	3.9	3.7	5.1	4.5
Other cereal flours and mixtures .....	3.3	3.9	8.0	7.2	8.0
Semolina .....	.2	( <sup>1</sup> )	.1	.1	.1
Wheat groats and meal .....	2.1	.1	.4	.3	.2
Oatmeal and groats .....	7.6	22.9	30.4	24.8	29.1
Corn meal and groats .....	.2	.1	.4	.7	1.0
Rice meal and groats .....	( <sup>1</sup> )	( <sup>1</sup> )	.1	.1	.3
Other cereal meal and groats .....	( <sup>1</sup> )	( <sup>1</sup> )	.1	.1	( <sup>1</sup> )
Wheat pellets .....	3.0	.5	6.4	.4	.4
Pellets of cereals .....	.3	1.8	.9	.9	5.2
Rolled or flaked cereals:					
Barley .....	.1	( <sup>1</sup> )	1.7	.5	.9
Oats .....	4.1	6.6	15.0	17.3	28.3
Other cereals, .....	5.2	15.3	21.7	9.1	4.7
	9.4	21.9	38.4	26.9	33.9
Subtotal .....					
Grains, hulled, worked, sliced:					
Barley .....	1.3	1.0	1.4	2.9	3.9
Oats .....	6.5	8.5	18.8	10.0	17.0
Corn .....	4.7	1.4	2.5	.5	.8
Other grains, except rice .....	.3	.4	.6	.3	.6
Subtotal .....	12.8	11.3	23.3	13.7	22.3
Cereal germ .....	1.6	3.1	9.7	15.2	21.5
Malt:					
Not roasted .....	6.3	28.7	37.6	38.8	43.0
Roasted .....	3.5	2.8	7.4	10.6	8.2
	9.8	31.5	45.0	49.4	51.2
Subtotal .....					
Starch:					
Wheat starch for food .....	1.4	1.3	1.6	1.0	1.3
Wheat starch, other .....	14.3	14.1	20.6	9.0	6.0
Corn starch for food .....	2.1	3.9	12.2	4.2	2.5
Corn starch, other .....	39.1	42.9	40.2	46.2	49.9
Potato starch .....	43.4	57.1	45.5	46.9	40.7
Cassava (manoc) starch .....	4.8	9.7	5.3	16.5	24.1
Cereal starch, not for food .....	2.0	1.2	2.1	2.1	3.1
	107.6	130.7	128.5	126.8	128.0
Subtotal .....					
Tapioca and starch substitutes .....	14.6	13.1	11.6	9.3	5.8
	224.2	328.1	463.9	446.4	453.9
Grand total .....					

See footnotes at the end of table.



Table A-13—Continued

## Milled grains, malts and starches: U.S. imports for consumption, by principal types, 1992-96

Type	1992	1993	1994	1995	1996
	<i>Value (million dollars)</i>				
Wheat flour:					
Hard spring .....	0.3	3.8	16.2	20.6	16.5
Durum .....	1.4	3.0	5.1	6.3	6.2
White winter .....	1.5	0.2	0.2	0.1	0.1
Other .....	9.1	17.0	23.6	19.7	23.2
	12.3	24.0	45.1	46.7	46.0
Subtotal .....					
Rye flour .....	( <sup>2</sup> )	0	( <sup>2</sup> )	0.1	( <sup>2</sup> )
Corn flour .....	1.3	1.4	1.9	5.0	4.3
Rice flour .....	1.9	2.5	2.5	3.5	3.3
Other cereal flours and mixtures .....	.9	1.1	2.2	2.4	3.3
Semolina .....	( <sup>2</sup> )	( <sup>2</sup> )	.1	.1	( <sup>2</sup> )
Wheat groats and meal .....	.4	( <sup>2</sup> )	.2	.1	.1
Oatmeal and groats .....	2.3	5.8	7.4	6.3	9.2
Corn meal and groats .....	.2	.3	.2	.4	.7
Rice meal and groats .....	( <sup>2</sup> )	( <sup>2</sup> )	.1	.1	.2
Other cereal meal and groats .....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
Wheat pellets .....	.2	.1	.4	.2	.2
Pellets of cereals .....	( <sup>2</sup> )	.2	.1	.1	.6
Rolled or flaked cereals:					
Barley .....	( <sup>2</sup> )	( <sup>2</sup> )	.3	.2	.3
Oats .....	1.5	2.2	4.7	5.5	12.4
Other cereals .....	1.1	2.3	3.4	2.0	2.0
Subtotal .....	2.6	4.5	8.4	7.7	14.7
Grains, hulled, worked, sliced:					
Barley .....	.4	.3	.5	.8	1.3
Oats .....	1.5	1.8	3.1	3.5	6.7
Corn .....	.7	.2	.4	.2	.2
Other grains, except rice .....	.4	.4	.3	.2	.6
Subtotal .....	3.0	2.7	4.3	4.7	8.8
Cereal germ .....	.4	.9	2.5	4.0	5.6
Malt:					
Not roasted .....	1.9	7.4	10.0	14.0	18.5
Roasted .....	1.1	.9	2.6	5.0	4.4
Subtotal .....	3.0	8.3	12.6	19.0	22.9
Starch:					
Wheat starch for food .....	.9	.8	.9	.7	.9
Wheat starch, other .....	3.2	3.5	4.9	2.8	2.0
Corn starch for food .....	.9	2.1	4.9	2.1	1.7
Corn starch, other .....	9.8	11.3	10.7	11.9	14.1
Potato starch .....	16.2	17.5	20.8	19.3	20.0
Cassava (manoc) starch .....	1.4	2.4	1.3	6.7	8.3
Cereal starch, not for food .....	.5	.8	1.1	1.2	.4
Cereal starch for food .....	1.8	1.3	2.1	2.1	3.4
Subtotal .....	34.7	39.7	46.7	46.8	50.8
Subtotal .....					
Tapioca and starch substitutes .....	6.8	4.7	4.1	4.3	.9
Grand total .....	70.2	96.5	131.9	151.3	174.6

<sup>1</sup> Less than 50,000 kilograms.<sup>2</sup> Less than \$500,000.

Note: Totals may vary because of rounding.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table A-14

## Milled grain, malts, and starches: U.S. imports for consumption, by principal sources, 1992-96

Source	1992	1993	1994	1995	1996
	<i>1,000 (Kilograms)</i>				
Canada .....	137,985	226,873	356,055	324,312	333,621
Thailand .....	19,785	25,761	19,631	29,825	34,438
Netherlands .....	19,904	27,065	25,358	23,274	18,950
United Kingdom .....	2,682	3,760	9,488	14,953	14,419
Germany .....	7,743	13,094	11,525	15,028	12,694
Mexico .....	6,404	6,995	8,396	14,515	11,984
Denmark .....	13,431	11,805	7,016	6,204	6,932
Belgium .....	1,031	1,515	2,235	3,623	4,732
Venezuela .....	408	424	590	918	2,280
China .....	567	518	837	1,217	1,473
All other .....	14,267	10,319	22,817	12,486	12,335
Total .....	224,208	328,130	463,947	446,358	453,861
	<i>(Thousands of dollars)</i>				
Canada .....	34,484	58,493	92,645	92,596	109,486
Thailand .....	8,352	8,694	6,847	13,343	14,176
Netherlands .....	8,223	8,857	7,490	9,240	9,125
United Kingdom .....	1,305	1,911	4,700	7,767	8,418
Germany .....	3,002	4,073	4,005	6,827	6,527
Mexico .....	1,983	2,768	3,051	4,793	4,362
Denmark .....	3,991	3,043	2,023	2,304	3,244
Belgium .....	1,068	1,443	1,958	2,789	3,551
Venezuela .....	225	256	387	788	3,618
China .....	595	457	972	1,296	1,610
All other .....	6,971	6,501	7,843	9,526	10,435
Total .....	70,199	96,496	131,920	151,268	174,553

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table A-15

Milled grains, malts, and starches: *Harmonized Tariff Schedule* subheading; descriptions; U.S. col. 1 rate of duty as of Jan. 1, 1997; U.S. exports, 1996; and U.S. imports, 1996

HTS subheading	Description	Col. 1 rate of duty as of Jan. 1997		Bound duty, Uruguay Round <sup>2</sup>	U.S. exports, 1996	U.S. imports, 1996
		General	Special <sup>1</sup>			
<i>Million dollars</i>						
1101.00.00	Wheat or meslin flour	0.9¢/kg	Free (E,IL,J,MX) (CA) 0.1¢/kg	0.7¢/kg	145	45
10	Hard spring wheat				( <sup>3</sup> )	16
20	Durum wheat				( <sup>3</sup> )	6
30	White winter wheat				( <sup>3</sup> )	( <sup>4</sup> )
90	Other				( <sup>3</sup> )	23
Cereal flours other than of wheat or meslin:						
1102.10.00	Rye flour	0.36¢/kg	Free (CA,E,IL,J,MX)	0.23¢/kg	( <sup>4</sup> )	( <sup>4</sup> )
1102.20.00	Corn (maize) flour	0.48¢/kg	Free (CA,A,E,IL,J,MX)	0.3¢/kg	31	4
1102.30.00	Rice flour	0.15¢/kg	Free (CA,A,E,IL,J,MX)	0.09¢/kg	2	3
1102.90	Other				9	3
20	Buckwheat flour	Free	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>3</sup> )	( <sup>4</sup> )
Other:						
30	Mixtures	16.4%	Free (CA,A,E,IL,J,MX)	12.8%	( <sup>3</sup> )	( <sup>4</sup> )
60	Other	14.5%	Free (CA,A,E,IL,J,MX)	9.0%	( <sup>3</sup> )	3
Cereal groats, meal and pellets:						
Groats and meal:						
1103.11.00	Of wheat	0.8¢/kg	Free (E,IL,J,MX) (CA) 0.1¢/kg	0.1¢/kg	4	( <sup>4</sup> )
20	Semolina				2	( <sup>4</sup> )
40	Other				2	( <sup>4</sup> )
1103.12.00	Of oats	1.3¢/kg	Free (A,CA,E,IL,J,MX)	0.8¢/kg	2	9
1103.13.00	Of corn (maize)	0.48¢/kg	Free (A,CA,E,IL,J,MX)	0.3¢/kg	61	1
20	Cornmeal				43	1
60	Other				18	( <sup>4</sup> )
1103.14.00	Of rice	0.15¢/kg	Free (A,CA,E,IL,J,MX) Free (E,IL,J,MX) 2%(CA)( <sup>6</sup> )	0.09¢/kg	( <sup>4</sup> )	( <sup>4</sup> )
1103.19.00	Of other cereals	14.5%		9.0%	2	( <sup>4</sup> )
Pellets:						
1103.21.00	Of wheat	Free	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>4</sup> )	( <sup>4</sup> )
1103.29.00	Of other cereals	Free	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>4</sup> )	1

See footnotes at end of table.

Table A-15-Continued

Milled grains, malts, and starches: *Harmonized Tariff Schedule* subheading; descriptions; U.S. col. 1 rate of duty as of Jan. 1, 1997; U.S. exports, 1996; and U.S. imports, 1996

HTS subheading	Description	Col. 1 rate of duty as of Jan. 1997		Bound duty, Uruguay Round <sup>2</sup>	U.S. exports, 1996	U.S. imports, 1996
		General	Special <sup>1</sup>			
<i>Million dollars</i>						
	Cereal grains otherwise worked (for example, hulled, rolled, flaked, pearled, sliced, or kibbled), except rice of heading 1006; germ of cereals, whole, rolled, flaked or ground:					
	Rolled or flaked grains:					
	Of barley . . . . .	3.2¢/kg	Free (E,IL,J,MX) 0.4¢/kg(CA)	2¢/kg	1	( <sup>4</sup> )
	Of oats . . . . .	1.5¢/kg	Free (A,CA,E,IL,J,MX)	1.2¢/kg	4	12
	Of other cereals . . . . .	0.73¢/kg	Free (CA,E,IL,J,MX)	0.45¢/kg	2	2
	Other worked grains (for example, hulled, pearled, sliced, or kibbled):					
	Of barley . . . . .	2%	Free (E,IL,J,MX) 0.2%(CA)	1.2%	4	1
	Of oats . . . . .	1.2%	Free (A,CA,E,IL,J,MX) Free (A,E,IL,J,MX)	0.5%	2	7
	Of corn (maize) . . . . .	0.73¢/kg	0.1¢/kg(CA)	0.45¢/kg	18	( <sup>4</sup> )
	Of other cereals . . . . .	4.3%	Free (A,CA,E,IL,J,MX)	2.7%	12	1
	Germ of cereals, whole, rolled, flaked, or ground . . . . .	7.3%	Free (A,CA,E,IL,J,MX)	4.5%	1	6
	Malt, whether or not roasted					
	Not roasted . . . . .	0.48¢/kg	Free (CA,E,IL,J,MX)	0.3%	42	18
	Malt, whether or not roasted					
	Not roasted . . . . .	0.54¢/kg	Free (CA,E,IL,J,MX)	0.42%	3	4
	Starches; insulin:					
	Starches:					
	Wheat starch . . . . .	0.87¢/kg	Free (A,E,IL,J,MX) 0.1¢/kg(CA)	0.54¢/kg	10	3
	For food use . . . . .				( <sup>3</sup> )	1
	Other . . . . .			( <sup>3</sup> )	( <sup>3</sup> )	2

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See footnotes at end of table.

**Table A-15-Continued**

**Milled grains, malts, and starches: Harmonized Tariff Schedule subheading; descriptions; U.S. col. 1 rate of duty as of Jan. 1, 1997; U.S. exports, 1996; and U.S. imports, 1996**

HTS subheading	Description	Col. 1 rate of duty as of Jan. 1997		Bound duty, Uruguay Round <sup>2</sup>	U.S. exports, 1996	U.S. imports, 1996
		General	Special <sup>1</sup>			
<i>Million dollars</i>						
1108.12.00	Corn (maize) starch . . . . .	0.87¢/kg	Free (A,E,IL,J,MX) 0.1¢/kg(CA)	0.54¢/kg	49	16
10	For food use . . . . .			( <sup>3</sup> )	( <sup>3</sup> )	2
90	Other . . . . .			( <sup>3</sup> )	( <sup>3</sup> )	14
1108.13.00	Potato starch . . . . .	0.72¢/kg	Free (CA,E,IL,J) 0.1¢/kg(MX)	0.56¢/kg	2	20
10	For human consumption . . . . .			( <sup>3</sup> )	( <sup>3</sup> )	11
90	Other . . . . .			( <sup>3</sup> )	( <sup>3</sup> )	9
1108.14.00	Cassava (manioc) starch . . . . .	Free	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>4</sup> )	8
1108.19.00	Other starch . . . . .	Free	( <sup>5</sup> )	( <sup>5</sup> )	17	4
	Cereal starches for					
10	non-food use . . . . .				( <sup>3</sup> )	( <sup>4</sup> )
90	Other . . . . .				( <sup>3</sup> )	3
1903.00.00	Tapioca and substitutes therefor prepared from starch, in the form of flakes, grains, pearls, or sifts or in similar forms:				1	4
1903.00.20	Of arrowroot, cassava, or sago . . . . .	Free	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>3</sup> )	3
1903.00.40	Other . . . . .	0.8¢/kg	Free (CA,E,IL,J,MX)	0.77¢/kg	( <sup>3</sup> )	1

<sup>1</sup> Programs under which special tariff treatment may be provided, and the corresponding symbols for such programs as they are indicated in the "Special" subcolumn, are as follows: Generalized System of Preferences (A); North America Free Trade Agreement (NAFTA), goods of Canada (CA); NAFTA, goods of Mexico (MX); Caribbean Basin Economic Recovery Act (E); United States-Israel Free Trade Area (IL); and Andean Trade Preference Act (J).

<sup>2</sup> Bound rates of duty were obtained from the Office of the U.S. Trade Representative, *Uruguay Round, Draft Uruguay Round Tariff Schedules of the United States, Vol. 1 Agriculture*.

<sup>3</sup> Not separately reported.

<sup>4</sup> Less than \$500,000.

<sup>5</sup> Not applicable since the column 1 rate of duty is free.

<sup>6</sup> See subheading 9905.11.10.

Note.—Notwithstanding the rates of duty set forth in Chapter 11, mixtures of the products classifiable in headings 1101, 1102, 1103, or 1104 (except mixtures classifiable in subheading 1102.90.30) are dutiable as follows:

column 1 (general)—16.4%  
 column 1 (special)—Free (E,IL,J,MX), 2%(CA)  
 column 2 20%

Source: U.S. exports and imports compiled from official statistics of the U.S. Department of Commerce.

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Table A-16

## Milled grains, malts, and starches: U.S. exports of domestic merchandise, by principal types, 1992-96

Type	1992	1993	1994	1995	1996
	<i>Quantity (1,000 metric tons)</i>				
Wheat flour .....	916.0	1,030.8	1,079.6	1,071.2	483.1
Rye flour .....	1.0	0.4	0.3	0.7	1.2
Corn flour .....	49.1	65.5	77.5	67.3	97.3
Rice flour .....	1.6	2.9	3.9	3.5	4.0
Other cereal flours .....	38.3	48.7	110.3	75.0	32.9
Semolina .....	8.5	7.0	4.8	7.1	7.9
Wheat groats and meal .....	14.5	11.3	17.8	12.5	8.1
Oat meal and groats .....	5.8	2.7	3.9	15.2	3.7
Corn meal and groats .....	148.0	164.0	177.1	178.2	212.8
Rice meal and groats .....	.5	.2	.1	.7	.4
Other cereal meal and groats .....	23.0	23.1	23.1	11.9	5.8
Wheat pellets .....	17.5	12.5	5.6	1.3	1.4
Pellets of other cereals .....	.4	1.7	11.6	1.7	1.7
Rolled or flaked cereal:					
Barley .....	4.5	2.4	1.5	.7	2.6
Oats .....	11.4	9.7	10.0	9.4	7.7
Other cereal except					
Rice .....	15.6	11.4	11.6	11.0	5.5
Subtotal .....	31.5	23.5	23.1	21.2	15.8
Grains, hulled, worked:					
Barley .....	1.8	1.2	.2	1.6	7.3
Oats .....	5.7	5.6	6.4	5.4	3.4
Corn .....	74.7	122.4	124.0	54.6	43.9
Other grains .....	75.1	86.0	33.7	75.4	41.2
Subtotal .....	157.3	216.4	164.3	137.0	95.8
Cereal germ .....	3.1	1.6	2.2	2.6	2.2
Malt:					
Not roasted .....	124.1	178.9	108.2	154.5	119.0
Roasted .....	1.8	5.2	10.9	8.4	7.0
Subtotal .....	125.9	184.1	119.1	162.9	126.0
Starch:					
Wheat starch .....	5.6	7.5	10.6	13.8	18.9
Corn starch .....	59.2	58.1	67.2	110.5	104.5
Potato starch .....	1.6	1.2	.9	1.6	2.3
Starch, other .....	10.5	6.8	18.0	20.8	31.9
Subtotal .....	76.9	73.6	96.9	146.8	157.6
Tapioca and starch substitutes:					
from starch .....	6.5	5.2	.6	.7	.7
Grand total .....	1,626.3	1,874.2	1,921.6	1,917.4	1,258.4

See footnote at end of table.

Table A-16-Continued

## Milled grains, malts, and starches: U.S. exports of domestic merchandise, by principal types, 1992-96

Type	1992	1993	1994	1995	1996
	<i>Value (million dollars)</i>				
Wheat flour .....	184.3	205.7	211.2	236.4	145.4
Rye flour .....	.2	.1	.1	.1	.3
Corn flour .....	16.2	21.9	25.8	23.2	31.0
Rice flour .....	0.9	1.6	2.1	1.8	2.1
Other cereal flours and mixtures .....	13.2	19.0	27.8	12.2	9.4
Semolina .....	2.3	2.1	1.1	1.7	2.0
Wheat groats and meal .....	3.1	2.3	2.6	2.7	1.7
Oat meal and groats .....	2.1	1.2	1.8	5.0	2.1
Corn meal and groats .....	24.6	34.4	43.2	44.3	60.8
Rice meal and groats .....	.2	.1	.1	.3	.3
Other cereal meal and groats .....	2.4	3.5	3.9	2.5	1.7
Wheat pellets .....	1.8	1.0	.7	.2	.2
Pellets of other cereals .....	.1	.4	2.1	.7	.4
Rolled or flaked cereals:					
Barley .....	.7	.6	.4	.1	.7
Oats .....	4.3	4.6	6.1	4.8	3.6
Other cereals, except rice .....	4.0	2.8	2.9	2.6	1.9
Subtotal .....	9.0	8.0	9.4	7.5	6.2
Grains, hulled, worked:					
Barley .....	.8	.2	.1	.9	3.7
Oats .....	2.4	2.6	2.9	2.4	2.0
Corn .....	16.2	19.7	27.5	13.4	18.4
Other grains, except rice .....	16.6	19.5	9.6	17.7	11.8
Subtotal .....	36.0	42.0	40.1	34.4	35.9
Cereal germ .....	1.2	.9	1.2	1.5	1.5
Malt:					
Not roasted .....	33.3	49.4	27.4	39.5	41.8
Roasted .....	.5	1.6	2.9	2.9	2.9
Subtotal .....	33.8	51.0	30.3	42.4	44.7
Starch:					
Wheat starch .....	3.0	3.3	6.0	6.1	10.0
Corn starch .....	34.6	35.7	40.0	51.2	48.9
Potato starch .....	1.4	1.0	.8	1.5	2.1
Starch, other .....	9.0	8.0	13.4	14.7	17.1
Subtotal .....	48.0	48.8	60.2	73.5	78.1
Tapioca and starch substitutes:					
from starch .....	2.1	1.4	.7	.9	.9
Total .....	387.0	444.7	464.3	491.1	424.7

Note.—Totals may vary because of rounding.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table A-17

## Wheat flour: U.S. exports of domestic merchandise, by leading markets, 1992-96

Source	1992	1993	1994	1995	1996
	<i>1,000 (Kilograms)</i>				
Haiti . . . . .	168,717	144,369	93,006	100,414	127,607
Mexico . . . . .	57,057	20,988	15,365	12,341	61,950
Bosnia-Herzegovina . . . . .	0	4,409	98,001	66,268	47,900
Peru . . . . .	44,265	39,434	41,703	45,132	29,860
Liberia . . . . .	0	494	6,042	15,580	27,617
Canada . . . . .	12,662	12,785	34,216	22,063	21,730
Bolivia . . . . .	40,468	27,024	34,864	27,593	20,607
Sierra Leone . . . . .	2,609	0	8,737	10,994	21,173
Dominican Republic . . . . .	2,534	2,465	3,115	12,165	13,366
Tajikistan . . . . .	0	0	0	9,371	10,055
All other . . . . .	587,686	778,852	744,561	749,248	101,261
Total . . . . .	915,998	1,031,820	1,079,610	1,071,170	483,126
	<i>(Thousands of dollars)</i>				
Haiti . . . . .	42,794	36,370	25,549	28,175	40,631
Mexico . . . . .	13,741	5,060	3,969	3,381	17,594
Bosnia-Herzegovina . . . . .	0	1,099	22,533	18,291	14,761
Peru . . . . .	10,939	9,382	10,265	12,237	9,111
Liberia . . . . .	0	63	1,304	3,510	7,033
Canada . . . . .	3,571	3,680	8,517	7,222	7,184
Bolivia . . . . .	8,929	6,379	8,763	8,136	6,275
Sierra Leone . . . . .	423	0	1,706	2,383	5,787
Dominican Republic . . . . .	945	796	1,210	4,222	4,085
Tajikistan . . . . .	0	0	0	2,692	2,850
All other . . . . .	102,974	142,899	127,430	146,120	30,074
Total . . . . .	184,317	205,728	211,246	236,369	145,385

Source: Compiled from official statistics of the U.S. Department of Commerce.



**Table A-18****Malt: U.S. exports of domestic merchandise, by leading markets, 1992-96**

Source	1992	1993	1994	1995	1996
	<i>1,000 (Kilograms)</i>				
Mexico	55,408	71,732	27,616	12,919	37,427
Japan	16,529	21,192	19,105	25,470	33,707
Republic of South Africa	0	0	0	0	18,083
Philippines	1,480	2,493	5,043	32,864	13,433
Dominican Republic	17,612	16,733	22,833	28,061	5,858
Brazil	4,653	2,135	4,978	2,992	5,241
Canada	316	307	8,073	12,462	1,449
Venezuela	5,134	5,090	0	6,150	2,503
South Korea	1,641	2,793	2,957	7,292	2,146
All other	21,469	56,714	24,001	17,909	4,481
Total	125,967	184,026	119,069	162,836	125,987
	<i>(Thousands of dollars)</i>				
Mexico	15,292	19,938	7,270	3,917	13,962
Japan	3,620	4,741	3,599	6,033	11,803
Republic of South Africa	0	0	0	3,499	7,074
Philippines	171	735	1,659	4,803	2,796
Dominican Republic	4,709	4,517	6,169	8,868	2,057
Brazil	1,178	573	767	979	2,331
Canada	196	227	1,825	3,724	920
Venezuela	1,330	1,407	0	2,199	892
Honduras	431	1,370	923	1,619	691
South Korea	192	699	603	890	610
All other	6,662	16,758	7,426	5,557	1,855
Total	33,781	50,965	30,241	42,364	44,715

Source: Compiled from official statistics of the U.S. Department of Commerce.

**Table A-19****Starches: U.S. exports of domestic merchandise, by leading markets, 1992-96**

Source	1992	1993	1994	1995	1996
	<i>1,000 (Kilograms)</i>				
Canada	13,673	16,049	17,820	17,108	38,128
Mexico	14,095	5,597	3,810	8,939	22,832
Japan	6,037	8,112	14,291	17,971	14,274
Netherlands	526	3,263	7,801	9,004	12,029
Philippines	833	689	1,679	5,474	10,639
United Kingdom	8,551	8,991	5,645	10,227	7,629
Indonesia	724	895	3,557	4,723	9,682
Malaysia	1,658	2,286	2,179	6,821	7,016
Taiwan	787	929	9,670	29,323	5,044
Costa Rica	1,875	2,249	1,615	2,600	3,045
All other	28,039	24,842	28,859	34,625	27,533
Total	76,792	73,896	96,928	146,816	157,584
	<i>(Thousands of dollars)</i>				
Canada	7,221	7,539	8,872	8,279	17,957
Mexico	4,535	2,061	1,745	3,480	7,984
Japan	4,894	5,321	10,070	11,091	9,060
Netherlands	361	1,537	3,571	4,925	6,290
Philippines	549	446	1,122	2,091	3,494
United Kingdom	5,629	6,572	3,819	6,644	5,598
Indonesia	447	620	1,650	1,470	2,737
Malaysia	848	1,669	1,658	2,419	3,162
Taiwan	629	786	2,861	8,560	2,005
Costa Rica	1,221	1,296	963	1,701	1,774
All other	21,739	20,326	23,800	22,875	17,972
Total	48,073	48,173	60,131	73,537	78,033

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table A-20

**Wheat flour: World imports, by leading markets, crop years 1991/92 to 1995/96**  
*(1,000 metric tons in wheat equivalents)*

Country/region	Crop year beg. July —				
	1991/92	1992/93	1993/94	1994/95	1995/96
FSU .....	1,041	507	330	642	1,200
Algeria .....	329	300	684	972	1,044
Yemen .....	608	525	807	1,072	909
Libya .....	726	637	588	712	666
Iraq .....	384	308	187	316	417
Sudan .....	209	70	228	345	328
Hong Kong .....	280	275	276	312	298
Vietnam .....	348	368	287	411	220
Egypt .....	487	1,084	623	344	214
All other .....	4,079	4,342	4,489	4,582	3,667
<b>Total</b> .....	<b>8,213</b>	<b>8,141</b>	<b>8,223</b>	<b>9,708</b>	<b>8,963</b>

Source: International Grains Council, *World Grain Statistics*, various issues.

**APPENDIX B**  
**EXPLANATION OF TARIFF AND TRADE**  
**AGREEMENT TERMS**

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In the *Harmonized Tariff Schedule of the United States* (HTS), chapters 1 through 97 cover all goods in trade and incorporate in the tariff nomenclature the internationally adopted Harmonized Commodity Description and Coding System through the 6-digit level of product description. Subordinate 8-digit product subdivisions, either enacted by Congress or proclaimed by the President, allow more narrowly applicable duty rates; 10-digit administrative statistical reporting numbers provide data of national interest. Chapters 98 and 99 contain special U.S. classifications and temporary rate provisions, respectively. The HTS replaced the *Tariff Schedules of the United States* (TSUS) effective January 1, 1989.

Duty rates in the *general* subcolumn of HTS column 1 are most-favored-nation (MFN) rates, many of which have been eliminated or are being reduced as concessions resulting from the Uruguay Round of Multilateral Trade Negotiations. Column 1-general duty rates apply to all countries except those enumerated in HTS general note 3(b) (Afghanistan, Cuba, Laos, North Korea, and Vietnam), which are subject to the statutory rates set forth in *column 2*. Specified goods from designated MFN-eligible countries may be eligible for reduced rates of duty or for duty-free entry under one or more preferential tariff programs. Such tariff treatment is set forth in the *special* subcolumn of HTS rate of duty column 1 or in the general notes. If eligibility for special tariff rates is not claimed or established, goods are dutiable at column 1-general rates. The HTS does not enumerate those countries as to which a total or partial embargo has been declared.

The *Generalized System of Preferences* (GSP) affords nonreciprocal tariff preferences to developing countries to aid their economic development and to diversify and expand their production and exports. The U.S. GSP, enacted in title V of the Trade Act of 1974 for 10 years and extended several times thereafter, applies to merchandise imported on or after January 1, 1976 and before the close of June 30, 1998. Indicated by the symbol "A", "A\*", or "A+" in the special subcolumn, the GSP provides duty-free entry to eligible articles the product of and imported directly from designated beneficiary developing countries, as set forth in general note 4 to the HTS.

The *Caribbean Basin Economic Recovery Act* (CBERA) affords nonreciprocal tariff preferences to developing countries in the Caribbean Basin area to aid their economic development and to diversify and expand their production and exports. The CBERA, enacted in title II of Public Law 98-67, implemented by Presidential Proclamation 5133 of November 30, 1983, and amended by the Customs and Trade Act of 1990, applies to merchandise entered, or withdrawn from warehouse for consumption, on or after January 1, 1984. Indicated by the symbol "E" or "E\*" in the special subcolumn, the CBERA provides duty-free entry to eligible articles, and reduced-duty treatment to certain other articles, which are the product of and imported directly from designated countries, as set forth in general note 7 to the HTS.

Free rates of duty in the special subcolumn followed by the symbol "IL" are applicable to products of Israel under the *United States-Israel Free Trade Area Implementation Act* of 1985 (IFTA), as provided in general note 8 to the HTS.

Preferential nonreciprocal duty-free or reduced-duty treatment in the special subcolumn followed by the symbol "J" or "J\*" in parentheses is afforded to eligible articles the product of designated beneficiary countries under the *Andean Trade Preference Act* (ATPA), enacted as title II of Public Law 102-182 and implemented by Presidential Proclamation 6455 of July 2, 1992 (effective July 22, 1992), as set forth in general note 11 to the HTS.

Preferential or free rates of duty in the special subcolumn followed by the symbol "CA" are applicable to eligible goods of Canada, and rates followed by the symbol "MX" are applicable to eligible goods of Mexico, under the *North American Free Trade Agreement*, as provided in general note 12 to the HTS and implemented effective January 1, 1994 by Presidential Proclamation 6641 of December 15, 1993. Goods must originate in the NAFTA region under rules set forth in general note 12(t) and meet other requirements of the note and applicable regulations.

Other special tariff treatment applies to particular *products of insular possessions* (general note 3(a)(iv)), *products of the West Bank and Gaza Strip* (general note 3(a)(v)), goods covered by the *Automotive Products Trade Act* (APTA) (general note 5) and the *Agreement on Trade in Civil Aircraft* (ATCA) (general note 6), *articles imported from freely associated states* (general note 10); *pharmaceutical products* (general note 13), and *intermediate chemicals for dyes* (general note 14).

The *General Agreement on Tariffs and Trade 1994* (GATT 1994), pursuant to the Agreement Establishing the World Trade Organization, is based upon the earlier GATT 1947 (61 Stat. (pt. 5) A58; 8 UST (pt. 2) 1786) as the primary multilateral system of disciplines and principles governing international trade. Signatories' obligations under both the 1994 and 1947 agreements focus upon most-favored-nation treatment, the maintenance of scheduled concession rates of duty, and national treatment for imported products; the GATT also provides the legal framework for customs valuation standards, "escape clause" (emergency) actions, antidumping and countervailing duties, dispute settlement, and other measures. The results of the Uruguay Round of multilateral tariff negotiations are set forth by way of separate schedules of concessions for each participating contracting party, with the U.S. schedule designated as Schedule XX.

Pursuant to the *Agreement on Textiles and Clothing* (ATC) of the GATT 1994, member countries are phasing out restrictions on imports under the prior "Arrangement Regarding International Trade in Textiles" (known as the *Multifiber Arrangement* (MFA)). Under the MFA, which was a departure from GATT 1947 provisions, importing and exporting countries negotiated bilateral agreements limiting textile and apparel shipments, and importing countries could take unilateral action in the absence or violation of an agreement. Quantitative limits had been established on imported textiles and apparel of cotton, other vegetable fibers, wool, man-made fibers or silk blends in an effort to prevent or limit market disruption in the importing countries. The ATC establishes notification and safeguard procedures, along with other rules concerning the customs treatment of textile and apparel shipments, and calls for the eventual complete integration of this sector into the GATT 1994 over a ten-year period, or by Jan. 1, 2005.



