

Consumer Trends in Grain Consumption

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Topic Highlights

- Trend drivers in developed countries are different from those in emerging markets and developing countries, but each can influence the other.
- Grain consumption worldwide is increasing, but direct consumption is decreasing as wealth increases and animal foods are selected.
- Gluten-free is needed for wheat allergy and celiac disease and related disorders but is unnecessary and expensive. It may be lower in nutrients especially dietary fiber and folate for those who do not need to adopt this diet.
- Low-carbohydrate, antigrain, and other fad diets impact grain consumption.
- Underconsumption of whole grains and overconsumption of grain-based desserts and snacks are trends that need to be addressed in many regions.
- The selection of alternate grains and sprouted grains is another emerging trend.

Learning Objectives

- To identify drivers that affect grain consumption and be able to show how those are different in different regions and economies,
- To name a number of sources of data, which track grain production and consumption,
- To describe drivers of grain consumption for specific grains,
- To distinguish between drivers that are trends and those that are fads and to attribute causes for both.

Introduction

Taste, cost, availability, convenience, and nutrition have a strong impact on consumer behavior and consumption with regard to food and grains. Many new trend drivers have been added or are exerting more influence than in the past. These include environmental concerns, concerns about food sustainability, the food–environment and food–fuel connections, food provenance and the ‘locavore’ movement, social norms that affect attitudes toward growers and producers of food including concerns about large agribusiness and spawning the growth of local markets and consumer-supported agriculture, the role of women in the society, the importance of food and the time spent devoted to food in a culture, the attitudes toward maintaining food traditions versus encouraging the use of new foods and methods of production and cookery, globalization of foods, fear and misunderstanding of technologies and practices involved in food production, distrust of long esteemed food staples such as grains, and worries about the rise in obesity and certain other diseases. All of these must be

balanced with the looming specter of inadequate food supplies to feed the anticipated population of 2050.

Consumer attitudes and ideas change continually, but these changes seem to occur at a faster rate in the age of social media, blogs, battling experts, 24 h news cycles, and talk shows, all which report the latest research findings sometimes with varying degrees of accuracy. If these voices persist, the information – regardless of its veracity – causes changes in food and grain consumption.

Perception is reality and consumer beliefs and trends drive the marketplace. Thus, it is important that those producing and manufacturing grain in planning for the long term be able to (1) differentiate between fads and trends, (2) to tailor food product development and market launches so that product introduction and supply meet consumer expectations, and (3) to predict changes in the future that allow innovation and are ready with supply chain and production to meet these changed demands.

International Consumer Trends

The trend toward consumption of higher-value food products across all income levels has risen in many countries in recent years due to higher disposable incomes. While changes in income affect consumption patterns, increased urbanization is an important driver. It often results in higher levels of education, in more women working outside the home, and in shifts from jobs that require much energy expenditure to more sedentary ones, and it may alter incomes and food choices both positively and negatively. Those trapped in urban ghettos may shift their diets to cheap, readily available calorie sources that may be poor choices in terms of nutrient density. However, consumers thriving in emerging economies such as China and Mexico shift their food purchases away from traditional diets and grains and other carbohydrate-rich staple foods to more expensive sources of calories, such as meat and dairy products, more packaged foods such as breakfast cereals and other frozen, instant or ready-to-eat options, and more foods prepared away from home. According to MarketsandMarkets, the most rapid rate of growth in the breakfast cereal category is expected to occur in the Asia Pacific region because of some of the aforementioned factors.

Some consumption trends affect health either positively or negatively. The trend reflecting the demand for healthier cereals and cereal products is happening in many regions. However, there is also the trend away from healthy, grain-based staples to increased consumption of grain-based desserts, pastries, and snacks, which may add little in terms of nutrition and may add many unneeded calories.

In terms of food and grains, urbanization often also means a mixing of people from various regions and ethnic groups introducing new foodstuffs and tastes and creating the

availability of a wide array of food products. Many jobs also require travel that introduces the population to more tastes, different grains, and different ways of using grains. Many multiethnic cities have markets and restaurants that offer an array of grain products from amaranth cereal, to buckwheat groats, to corn tortillas, to porridge (oat meal), to quinoa pilaf, to rye crisp, to sorghum beer, to rice noodles, to breads from all over the world.

Tracking Consumer Trends

Governments have traditionally tracked the supply and availability of grain-based foods. This is done in a variety of ways. Government and international food and agriculture bodies such as WHO/FAO collect statistics that give information on types and varieties of grain and other products grown; cost and availability of seeds and inputs; stores of grain; weather, environmental, and other factors that affect crop planting, yield, and market availability; food disappearance and consumption; health issues; and economic factors. Data are usually country- or region-specific, but trends in one region may influence consumption in another region.

Food consumption data collected by governments, academia, and industry monitor what has been eaten. If collected in a consistent manner, they document changes in patterns of food intake. These may also be useful in predicting what will be needed in greater or lesser quantities in terms of nutrition and the marketplace and may help distinguish between what might be a fad and a trend.

Trend watchers and marketers conduct and scan material from books, media, blogs, and other social media, especially in areas that intersect with food such as cooking, health and medicine, energy and the environment, employment and income factors, and agricultural economics. Pronouncements about nutrition by various authoritative bodies impact food choices and messaging about food. Government regulation also impacts what may be sold and what may be said about it. For example, in Mexico, breakfast cereals are being rated with a tax as a measure to address obesity. This causes cereal manufacturers to reformulate to meet government guidelines and to launch more high-fiber or reduced-sugar versions. Understanding how these factors interact can help predict consumer food trends.

Trends in Grain Usage and Its Impact on Consumers

Data on supply and disappearance of grains are followed in many regions. For example, the Economic Research Service (ERS) of the US Department of Agriculture (USDA) report consumer demand for food by US households. This may influence the types of crops that farmers grow; the prices farmers receive; how crops are grown, handled, and manufactured; and ultimately what grain products are produced. ERS data on acres planted, yields, stores, and other vital data for the major food grains (wheat and rice) and the major feed grains (corn, barley, oats, and sorghum) also give an idea of grain supply and stores to assess food security for a population. The ERS working with the Census

Bureau and other government agencies. Publicly available databases play a key role in assessment of nutrient intakes and evaluation of the risks related to possible hazards in food.

Trends in Worldwide Wheat Consumption

In the 1990s and the first decade of the 2000s, world wheat consumption continued to expand in response to rising population and incomes. Rising wealth fosters increased consumption of meat, meaning that more wheat and grains are being used as animal feed, thus boosting total usage. However, in some countries, direct human consumption of wheat is decreasing. For example, wheat consumption in the United States has decreased since 1997. The pattern of wheat consumption is shown in Figure 2. Per capita wheat use declined from a high in 1879 when one in every four was on the farm and many engaged in hard physical labor, making the per capita consumption 102.27 kg. For nearly 100 years, until the 1970s, wheat use dropped to a low of 50 kg per capita as energy required for both work and play decreased, wealth increased, and diets became more diversified. By 1997, wheat use had rebounded to 66.72 kg per capita. The overall growth in per capita use that occurred between 1973 and 1997 reflected changes that included (1) the boom in away-from-home eating and fast foods with their buns or other grain-based food items, (2) an increase in ready-to-eat options such as breakfast cereals, (3) widespread dietary guidance that promoted diets low in fat and high in carbohydrates and grains for controlling coronary disease, and (4) a wider recognition of health benefits stemming from eating bran, oat bran, and other high-fiber, grain-based foods.

The 30-year pattern of increased wheat consumption ended in 1997. There are many reasons for this trend: (1) the decrease in energy expenditure, (2) concern about increases in rates of overweight, obesity, and rising chronic disease, and (3) a number of missteps with the introduction of low-fat products, often

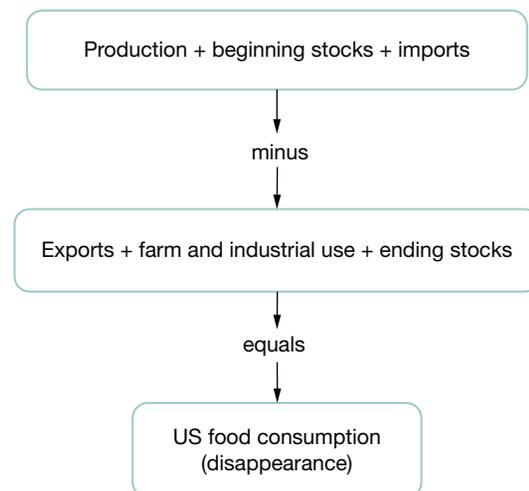


Figure 1 Estimation of food available for consumption (disappearance data) in the United States. Data from USDA/Economic Research Service.

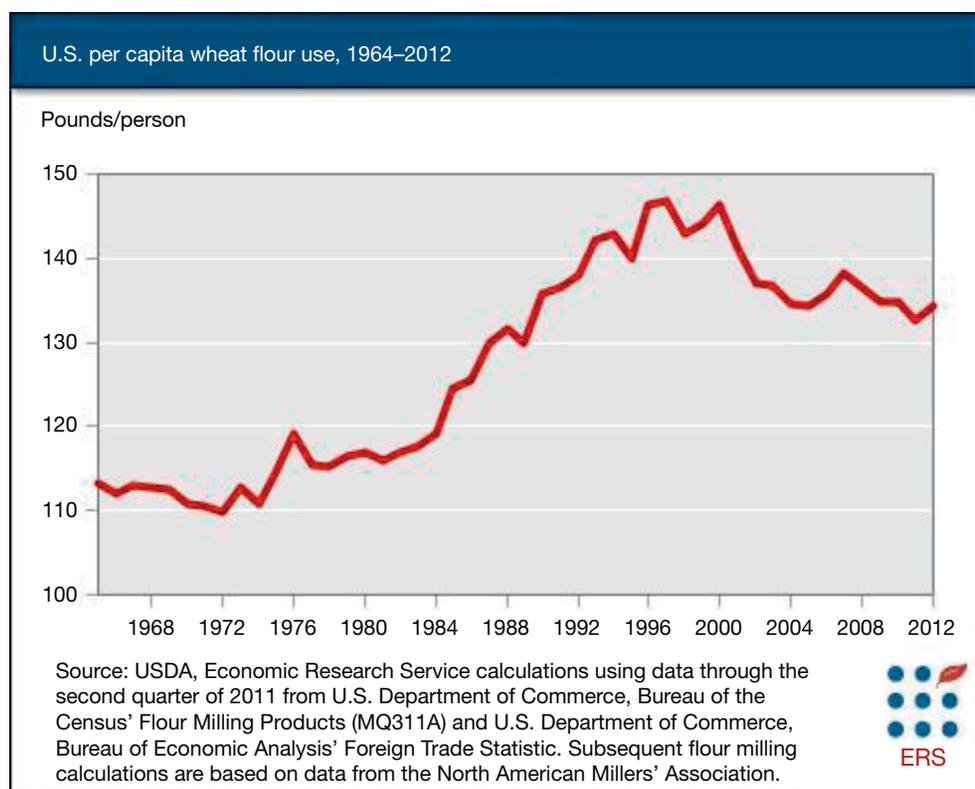


Figure 2 US per capita wheat flour use, 1964–2012.

formulated with grains, that failed to either address overweight or add nutrient quality.

Thus, around the turn of the millennia, consumers switched from low-fat diets to low-carbohydrate diets of various types such as the Dr. Atkins Diet Revolution and the South Beach Diet. Some of these ketogenic diets allowed only 200 cal from all carbohydrates, so that there was a decrease in consumption of all carbohydrates and grains. This switch reduced per capita wheat and grain consumption. Consumer interest in low-carbohydrate diets spiked after 2000, although this trend continues because of medical literature showing that it is a successful diet pattern for some dieters.

ERS estimated per capita wheat flour use at 60.22 kg in 2011. New allegations about wheat and wheat products from blogs and books bashing gluten, wheat and wheat breeding, and grains in general continue to keep wheat consumption at lower levels than in 1997.

Whole Grains, Carbohydrate Quality and Glycemic Response as Trend Drivers

The type of grain and wheat products is also changing. Since 2000, emerging science around the health benefits of whole grains was translated into dietary guidance in many countries with recommendations to substitute a portion of refined and enriched grain staples with whole grain breads and cereals, for example, to 'make half your grains whole.' Across many continents, this effort is reflected in groups such as Australia and New Zealand's Grains and Legume Nutrition Council or

the HEALTHGRAIN project in the EU. Nordic efforts to increase rye and oats and other whole grains are part of a healthy eating advice. In Italy and France, there also has been a modest increase in whole grain products with successful launches of whole grain pastas and other products. The Whole Grains Council, which has international reach, has documented a marked increase in the number of whole grain foods and a shift to whole grain offerings in all categories.

Data show that consumers in Western countries eat too many refined grain servings and too few whole grain servings such that their calories exceed their energy needs. Grain-based desserts and snacks provide nearly as many calories as sugar-sweetened beverages in the US diet of children and teens. Since many of these grain foods offer little in the way of nutrition, it is critical that health professionals and the food industry work together to both improve the nutritional contribution of such products and promote their consumption in the correct serving sizes and as special treats.

Concern about the glycemic impact of foods including wheat and grain products has caused some to use glycemic index (GI) in as part of dietary advice, especially for diabetics. Either some governments have allowed (Australia) GI labeling or some merchants (the United Kingdom) have voluntarily labeled foods including grain-based foods with GI. Some government bodies such as Health Canada have decided that the GI is not appropriate for food labeling because of problems with measurement and lack of consumer understanding. When used, dietary guidance in these countries encourages consumers to select products in the same category with GIs

deemed low to moderate. In some cases, foods carried a GI label, and then, for a variety of reasons, the voluntary labeling was withdrawn. Such labeling can impact the type of grain foods selected and has become a driver in the selection of many carbohydrate foods.

Gluten-Free and Wheat and Grain Avoidance Trends

Gluten-free and the avoidance of wheat, gluten, and grain have become both a fad and a trend in some developed countries in the last few years. The trend is also being exported and adopted in some emerging economies.

Data published in 2008 changed the thinking in health professions regarding the incidence of celiac disease. These data showed that the incidence, instead of being 1 in 2500, is around 1 in 133, and it is underdiagnosed. And data from the United States, Finland, and even Asia Pacific countries – where the overall incidence is low – show that celiac disease incidence is increasing.

Nonceliac gluten sensitivity has been proposed as a gluten-related disorder. The condition has no medically vetted diagnostic test and no agreement about its incidence, but is characterized by a cluster of symptoms including gas and distention.

Beyond these conditions, the trend toward reduced wheat and grain consumption is driven by books and blogs suggesting that modern wheat and grains are addictive leading to overconsumption of grains and are causing obesity and other chronic diseases and health conditions. These same sources demonize not only high sugar intake but also wheat and grains, especially refined grains. Some make consumers believe that foods labeled as gluten- or wheat-free are more nutritious than their gluten-containing counterparts.

Summing of all those who need to avoid gluten – those with wheat allergy, celiac disease, and nonceliac gluten sensitivity – means that around 6–8% of the population needs to avoid gluten. In 2014, as many as 30% of the North American population said that they sometimes avoid wheat and gluten. This is also a trend in Australia and New Zealand with 10% of the population indicating that they are avoiding gluten. In terms of markets, the United Kingdom has the biggest gluten-free market in all Europe, but Germany has the largest market on the continent. Italy and Scandinavia also have a sizeable market. Yet, all of these countries have about 1% of consumers with celiac disease. Compared to other European countries, sales of gluten-free foods are on the low side in both France and Spain.

In terms of trends, the gluten avoidance fad will have an impact for a while and will likely diminish. However, there will be a baseline trend for those with celiac disease, allergies, and other gluten issues that will remain and may increase. Concern over carbohydrate quality will remain high, and changes in types of carbohydrates and grain-based foods will serve as another trend driver.

Rice

Rice supplies around 20% of the calories consumed worldwide and is a staple for nearly half of the world's 7 billion people.

More than 90% of the world's rice is consumed in Asia, where it is a staple for a majority of the population, including some of the world's poorest populations. Developing countries have long depended and continue to rely on rice's versatility, protein availability, and high caloric value.

From the 1960s to the 1990s, Asia's per capita rice consumption went from 85 kg per year to nearly 103 kg. In that same period, per capita consumption rose from 50 to 65 kg per year. The rising per capita consumption plus the growing population more than doubled global rice consumption during this period from 150 to 350 Mt.

Changes in the standard of living have altered rice consumption patterns. Increased wealth in countries such as India and China slowed the rate of growth in rice consumption due to a switch to foods with higher value such as meat and produce. In some countries such as Japan and Taiwan, there is decreasing rice consumption due to Westernization of the diets, a decline of family size, increasing participation rate of women in labor market, and aging populations. However, rice consumption continues to rise in Southeast Asia (the Philippines and Indonesia), South Asia (India and Bangladesh), and many parts of Africa. After Asia, the second largest rise in rice consumption occurs in sub-Saharan Africa. Overall, the rising populations of emerging and developing economies cause a rise in overall rice consumption. For those needing to avoid gluten, rice has become an important substitute. Recently, concern about arsenic in rice has been raised as an issue and may impact consumption.

In summary, increasing wealth in some countries may shift consumers away from rice and grains to other foods afforded by higher-income consumers, but the increases in population in many countries offset any decline in worldwide consumption. Worldwide rice production was 600 Mt in 2000. It is predicted to increase 1.5 times by 2030, to 904 million tonnes with gains in production in nearly all areas.

Maize, Oats, Sorghum, and Barley

Maize (corn), sorghum, barley, and oats are used more as feed grain than as human food. Maize contributes one-third of the world's cereal output. Demand for maize as a feed grain will increase. Globally, maize production has increased by nearly 50% due to expansion in Asia and high-yielding varieties including genetically modified corn (bT-corn). Differences in consumer attitudes to the GM corn around the world have dramatically affected its acceptance. The challenge this creates for international trade of maize and future production must be addressed and can sharply impact trends in its use as a feed or food grain.

Only 15% of maize is processed for human food to become a variety of milled grain products and starch, sweeteners, corn oil, and alcoholic beverages. Direct use of maize as human food is unlikely to change significantly, even in countries where maize is an integral part of local diets.

Oats are an important foodstuff in northern climates because they tolerate cooler summers and more rain than many grains. Oat production has remained steady for the past 10 years. The EU region is the largest producer of oats, but Canada is the largest exporter. The United States is the

world's largest importer of oats, even though it is the world's fourth largest oat producer. Mexico is the world's second largest oat importer, followed by Japan.

Per capita consumption of oats is high in former colonies of the United Kingdom with Canada and Australia topping the consumption charts. Russia, the United States, Poland, the United Kingdom, and Scandinavia are countries with a higher consumption of oats than many countries. In the United Kingdom, oats comprise 3% of the crops cultivated, but half the oat crop is used as human food where about 50% of the population eat porridge (oatmeal).

Among the grains, oats is viewed as a healthy grain. This trend began with the 'oat bran' craze of the late 1980s when research documented the health benefits of oats. Its status as a whole grain and high nutritional marks, with its micronutrients, phytochemicals, and protein content ranking high among the grains, continue to lure consumers.

The real driver for oats consumption is its viscous fiber β -glucan. The data on its cholesterol-lowering ability are so well documented that it has a health claim in a number of countries. The first of many claims was in the United States in 1997 with other countries following. Interest in the health value of oats is expected to continue as consumers continue to want good-tasting, high-fiber whole grains. Emerging research on benefits of oats for blood glucose control and satiety keeps consumers interested, and the production of gluten-free oats for celiacs is driving demand for oats.

The only concern is that oats is the only major world crop where production has shown a steady decrease since 1970. The decline amounts to a total of about 60%.

Barley

Only 2% of the barley crop is used directly for human food. Malt production for beer takes over 40% of the crop. Barley, like oats, contains the soluble fiber β -glucan, which has been associated with maintaining healthy cholesterol levels and healthy heart. In 2005, FDA amended its health claim for soluble oat fiber and coronary heart disease to include barley. Studies indicate that barley may also have potential in modifying glycemic response in humans. Also, the vitamin E of the outer layers of whole barley may be important. There is a trend by consumers to romanticize ancient grains, and barley is considered part of this ill-defined category. Use of barley as sprouted grains is also showing some consumer interest.

Trends in Consumer Consumption

In many countries throughout the world, calorie intake has increased since 1970. Despite charges to the contrary that excesses are due to one food group such as grains, data from ERS suggest that food availability and consumption for all major food groups have increased. The ingestion of more energy over the last three decades has not been translated into more people meeting dietary recommendations for certain food groups and nutrients.

The 2005 *Dietary Guidelines for Americans* recommend (for those on a 2000-calorie-per-day diet) the consumption of 6 ounce equivalents (oz-eq) of grains per day with whole grains

accounting for at least half of this amount. Using ERS's loss-adjusted food availability data from 2005, it is estimated that more grain servings than recommended (8.1 oz-eq of grains per person per day versus the 6 recommended) were consumed. Instead of half of these as whole grains, nearly 90% was as refined grains. Consumption data for children and teens show that nearly as many calories emanate from consumption of grain-based desserts and snacks as do from sugar-sweetened beverages. Thus, Americans, on average, overconsume refined grains with added sugar and fat and underconsume whole grain staples. Only a small percentage of the population was eating the recommended amount of whole grain. Efforts to bring total amount of grain eaten in line with recommendations while substituting whole grains for refined grains must continue in order to reverse current trends.

It is difficult to predict what economic and agronomic conditions and policies, geopolitical climates, and technical advances will affect food pricing and availability and costs especially with population, fuel, and environmental pressures. Trend drivers such as new health research, social media with food fads and scares, changing social norms, adoption of foods from other countries, and other issues related to consumers will continue to affect consumption but are hard to predict. Trend watchers and available data sources can track trends and may be used to help answer critical questions about food choices.

Summary

Consumption data for grains and grain-based foods relate to a number of trends. Major factors that affect trends around the world include demographics (age, household size, household income, women in the labor force, amount of education, geographic location, and ethnic background), diverse lifestyles, and consumer attitudes (toward food habits and food preferences). Consumer trends that affect movement of grain-based foods through the food system include food marketplace trends, food processing/manufacturing trends, and agricultural trends. Major trends in the food system include niche marketing, development of grocery stores to improve food shopping convenience, increased demand for and development of convenience foods, and the growing demand for food away from home.

Exercise Assignments for Revision and Extension

- Compare the effects of agriculture policy in a country from the developed world and developing world and see how it affects grain consumption trends.
- Follow two different grain food fads within a country and see what caused the fad, how long they lasted, and at what rate they rose and fell, and compare the drivers of the trend.
- Compare a grain food fad in different countries and see what is similar and different.
- What are the trend drivers needed to change attitudes regarding grains produced using biotechnology?
- Examine the trend behind distrust of traditional breeding among some sectors.

Exercises for Readers to Explore the Topic Further

- Discuss impacts of inputs (water, fuel, fertilizer, etc.) on trends in grain consumption in a region.
- Study the interaction of food trends such as the locavore movement, the Paleo diet, and other meat-based antigrain diets and the organic movement on grain and food production and the ability to feed a growing world population.

See also: **The Cereal Grains:** Oats, Overview (00013); Rice, Overview (00015); Wheat – An Overview of the Grain that Provides “Our Daily Bread” (00020); Barley: An Overview of a Versatile Cereal Grain with Many Food and Feed Uses (00021); Maize Overview (00022); **Grains around the World:** Grain Production and Consumption, Overview (00051); **Food Grains and the Consumer:** Grains and Health (00067); Genetically Modified Grains and the Consumer (00075); Grains and Health – Misinformation and Misconceptions (00078); **Food Grains: Intolerance, Allergy and Diseases:** Celiac Disease (00083); **Carbohydrates:** Beta glucans and health (00096); Glycemic index (00098).

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