



Kellogg's

Cereal: The Complete Story

Kellogg's

Let's make today great™

Quick facts on breakfast cereal.

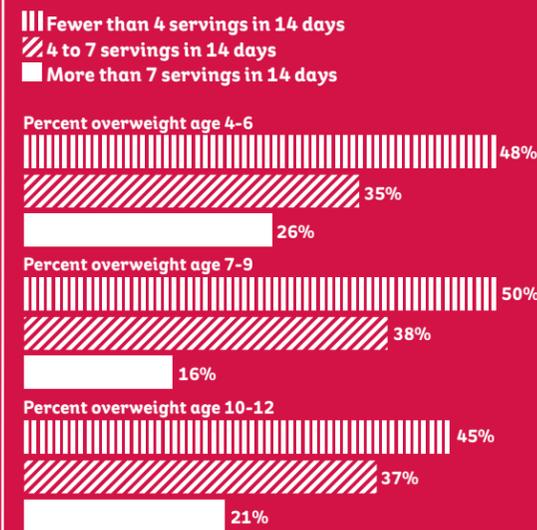
Average calories per serving by breakfast type.

Cereal compares favorably to many other traditional choices.¹



Children who eat cereal regularly tend to have lower BMIs.**

Studies have shown that the consumption of cereal for breakfast is associated with lower BMI in children, a relationship that holds regardless of the amount of sugar in the cereal.^{2,3}



Cereal is a smart economic choice.

Average cost of a serving of cereal with milk:



A healthy family habit.

Sharing 3 or more family meals per week (including breakfast) pays off for children, making them:⁴



Good mornings begin here.

The latest science on breakfast cereals.

Since introducing *Kellogg's Corn Flakes* in 1906, Kellogg has invested decades of science and product development into health and nutrition. From being the first food company to employ our own dietitian, to running our own research labs and closely monitoring independent studies on breakfast, cereal, grains and fiber all around the world, we aim to keep abreast of the ongoing scientific advancements in nutrition and food research and take this into account as we strive to enhance existing cereals and develop new cereals.

What we learn constantly shapes our future direction. In the past few years, it's helped us respond to consumer and market demands to lower sugar and sodium, as well as to increase the fiber and maintain the great taste in many of our cereals. We're always looking for ways to provide more nutritious, convenient and affordable foods loved by consumers around the world.

Because the information we've gained has added to our own knowledge base, we're eager to share it with others, too. That's why we've gathered the latest evidence-based research about breakfast and cereal in these pages. We hope *Cereal: The Complete Story* provides a valuable resource for your own research, teaching and information. We'd love to hear your thoughts, questions and ideas at corporateresponsibility@kellogg.com.

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**Body Mass Index (BMI) is a measure that indicates body "fatness" as function of weight adjusted for height; kg body weight / height (m²).

What is cereal?

The word “cereal” comes from the name Ceres, the ancient Roman goddess of the harvest. Cereals have been people’s basic food since Neolithic times, following the birth of agriculture, which initially focused on the cultivation of wild grains.

In the most basic form, cereal is a food derived from any plant in the grass family that yields edible grain or seed. Barley, corn, oats, rice, rye and wheat are among the most popular grains.

How grains become cereal.

It’s a short road from the farmer’s field to the cereal bowl.

Our cereals start with grains and through a simple process lead to great foods like *Kellogg’s Mini-Wheats*, *Rice Krispies* and *Corn Flakes*, which have five or fewer ingredients (not including vitamins and minerals).



Kellogg’s Corn Flakes begin with flattened grits of corn.

Kellogg’s Frosted Mini-Wheats begin with shredded wheat berries.

Kellogg’s Rice Krispies begin with puffed grains of rice.

A cereal breakfast. Why it’s the best way to start the day.

Experts worldwide agree: Breakfast is the most important meal of the day. After 8 to 12 hours without eating, our brains and bodies are ready to refuel. A breakfast of ready-to-eat cereal can help kick-start our metabolism and set us up for a more successful day.

An accumulating body of evidence shows the value of eating a cereal breakfast. Research shows that cereal:

1. Can help reduce disease risk factors. Numerous studies show that a cereal breakfast is associated with lower BMIs in both children and adults.^{2, 5} Obesity and overweight are risk factors for many lifestyle-related diseases and disorders including cardiovascular disease, diabetes, certain cancers, stroke and arthritis. In helping to reduce the risks associated with being overweight, cereal breakfasts appear to confer an ongoing reduced risk of other lifestyle-related conditions.^{6, 7}

A long-term study of male participants found that those who regularly ate breakfast cereals had a lower risk of developing Type 2 diabetes after adjusting for age, smoking habits, BMI, physical activity, vegetable consumption and alcohol intake.⁸

Another study reported that individuals who ate breakfast cereal seven or more times per week had a 19% reduced risk of hypertension compared to those who never ate breakfast cereal.⁹

2. May help promote future health. Establishing the habit of eating breakfast in childhood may confer cardiometabolic risk factor benefits. A study in Australia examined breakfast skipping and cardiometabolic risk factors and found that those who skipped breakfast in both childhood and adulthood had larger waist circumferences and higher fasting insulin, total and LDL cholesterol concentrations compared to those who ate breakfast.¹⁰

The type of breakfast chosen may also impact cardiometabolic risk. More frequent cereal consumption in children is associated with lower waist-to-height ratio, total cholesterol

and LDL cholesterol (after taking into account sociodemographic variables, physical activity levels and total energy intake), and therefore, fewer markers of cardiovascular risk. Childhood patterns of cereal consumption may reduce risk factors later in life.⁵

3. Enhances general well-being. Several studies have reported that eating breakfast cereal on most days improves general well-being. People who regularly eat cereal tend to be less stressed, less anxious and are less likely to be depressed. Research to determine the underlying factors responsible for these effects is ongoing.^{11, 12, 13, 14}

4. Offers variety for diverse consumer tastes and needs. Cereal is nutritious, and because it comes in so many appealing varieties, flavors and textures, it can help solve specific nutritional challenges faced by certain demographics. For example:

Children get nutrients they might otherwise miss, in a great-tasting food that encourages them to eat breakfast.

Expectant mothers in the U.S. get folic acid, vitamins A, C, D and E, iron, zinc, calcium and fiber.

Because eating cereal is associated with improved nutrient intakes,¹⁵ it may be a simple, safe and inexpensive way to get the nutrition pregnant women need.

The elderly get necessary nutrients for relatively few calories, which is important because calorie needs decline as we age, but nutrient needs do not.

Continued on next page



A cereal breakfast. Why it's the best way to start the day, continued.

5. Is typically a low-fat, cholesterol-free food, which fits into healthy eating recommendations.

6. Is relatively low in calories and nutrient-dense. An average serving of cereal with skim milk has 152 calories (less than many other breakfast choices) and delivers valuable essential nutrients including B vitamins and iron. Some *Kellogg's* cereals are fortified with additional nutrients such as vitamin D. Nutrient-dense foods are emerging as particularly important in addressing the rising incidence of overweight in many countries and reduced energy intakes in groups such as the elderly.¹⁶ See Figure 1

7. Helps incorporate milk into the diet. Ninety-five percent of ready-to-eat cereal in developed markets is eaten with milk, making breakfast cereal an important driver for milk intake.¹⁷

More research suggests that breakfast can help support mental performance.

- A study of high-school students reported that breakfast demonstrated positive effects on mood, cognitive functioning and self-reported alertness.²⁰
- Research shows that eating breakfast is positively associated with short-term memory,^{21, 22, 23} episodic memory²⁴ and recall.²⁵
- A recent review of 22 studies²⁶ suggests that eating breakfast may help children do better in school by improving memory, test grades, school attendance,

In some population groups, about half of all milk consumed is taken with cereal. In addition to getting essential calcium from milk, some *Kellogg's* cereals are fortified with calcium. Calcium is a nutrient of concern in many population groups, but groups of particular concern, due to low calcium intakes, include children, adolescent girls, women and older adults.¹⁸ Because cereal is eaten with milk, it is also a terrific gateway to calcium, vitamin D and protein.¹⁷

8. Is convenient. Ready-to-eat cereal makes it easy to start the day with the nutrition people need. Nine out of ten moms agree that cereal makes a convenient breakfast choice.¹⁹

9. Is affordable. At a fraction of the cost of many other popular breakfast options, cereal is an affordable choice. See Figure 2

- psychosocial function and mood. Students participating in the school breakfast program had significantly greater increases in math grades, fewer school absences and tardiness than children who did not participate.²⁷
- Another study found that subsidized meals at school or day care are beneficial for children's weight status, and expanding access to subsidized meals may be the most effective tool to use in combating obesity in poor children.²⁸

Eating cereal can improve nutrient intakes.

FACT: Ready-to-eat cereal + milk = A leading source of nutrients in diets.*

In many countries, *Kellogg's* breakfast cereals are fortified with a range of vitamins and minerals depending on consumer needs, technical capability and regulatory requirements. These nutrients have been shown to confer positive benefits in terms of nutrient intakes at breakfast.

Studies show that when essential nutrients are missed at breakfast, people typically don't compensate for that loss during other meals.²⁹ In fact, people who don't eat cereal at breakfast are more likely to have suboptimal nutrition intakes.³⁰

From the U.S. and U.K. to Spain, Greece and Australia, studies have consistently shown that breakfast cereals make a positive contribution to nutrient intakes.

Most studies have focused on children and show better intakes of B vitamins (thiamin, riboflavin, niacin, folic acid B6 and B12) and iron in those children who eat breakfast cereal regularly.^{31, 32, 33, 34, 35}

The cost effectiveness of nutrient-dense breakfast cereal becomes even more important in lower socioeconomic groups. A recent study in low-income earners in the U.K. found that breakfast cereals were major contributors to micronutrient intakes in this group.³⁶ See Examples 1 & 2

*Fortification supported in many other countries.

Figure 1

Average calories per serving by breakfast type.

Cereal compares favorably to many other traditional choices.¹



Figure 2

Cereal is a smart economic choice.

Average cost of a serving of cereal with milk:



Figure 3

A healthy family habit.

Sharing three or more family meals per week (including breakfast) pays off for kids, making them:⁴



Example 1

Nutrient intake comparisons.

Australian 2- to 18-year-olds who regularly ate a cereal breakfast had:

- Lower intakes of salt and fat
- Higher intakes of fiber, calcium, magnesium, B vitamins, iron and zinc compared to those who chose a different type of breakfast³⁵

American 9- to 13-year-olds who eat ready-to-eat cereal take in:

- 49% more iron than kids who eat other types of breakfast
- 35% more Vitamin A than those who ate other types of breakfast
- 55% more Vitamin A than breakfast skippers³¹

Example 2

Dietary impact of cereal fortification.

In the U.S.* fortifying cereal helps:

- 6 million more children and 16 million more adults meet vitamin A recommendations
- 3 million more children and 13 million more adults meet folic acid recommendations
- 2 million more children meet zinc recommendations
- 2 million more children and 13 million more adults meet vitamin A recommendations³⁷

In the UK:*

- Children age 4-18 who typically consume 30-40 grams of breakfast cereal daily have a 20-60% higher intake of iron, B vitamins and vitamin D when compared with those who do not consume as much cereal. Those who consume more breakfast cereal also had better folate, riboflavin and vitamin B12 levels.³²

In Canada:*

- Cereal is the number-one contributor of iron in preschool-age children.³⁸

*Fortification supported

Cereal eaters beat breakfast skippers in terms of BMI.

New evidence points to a positive relationship between eating cereal for breakfast and a lower BMI.

Cereal eaters have lower BMIs.

While the research about the benefits of breakfast is well recognized, the number of people skipping it is still too high. Of greatest concern is the increased prevalence of skipping breakfast as adolescents enter young adulthood. This behavior, which appears to happen in most countries globally, has been associated with unhealthy weight gain.³⁹ A recent review of breakfast skipping in the Asia-Pacific region reported that skipping breakfast is associated with a higher likelihood of being overweight, indicating that the benefits of breakfast hold true regardless of cultural diversity.^{40,41} See Figure 3 on page 5

Breakfast skipping among children and adolescents is associated with a number of poor health outcomes and health-compromising behaviors, including

higher blood cholesterol and insulin levels, smoking, alcohol use, physical inactivity, disordered eating and unhealthy weight management practices.^{42,43,44,45}

Breakfast cereal eaters have been found to have lower BMIs.⁴⁶ Research suggests that breakfast consumption, and specifically ready-to-eat cereal, has a positive relationship to healthy body weights and improved diet quality for adolescents,³ making it worth encouraging by parents, schools, government and health professionals. See Figures 4, 5 & 6



Figure 4

Children who eat cereal regularly tend to have lower BMIs.

Numerous studies have shown that the consumption of cereal for breakfast is associated with lower levels of BMI in children, a relationship that holds regardless of the amount of sugar in the cereal.^{2,3}

■ Fewer than 4 servings in 14 days
 ▨ 4 to 7 servings in 14 days
 ■ More than 7 servings in 14 days

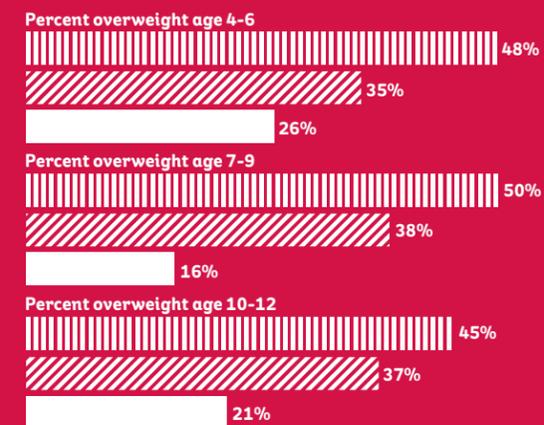


Figure 5

Cereal eaters score better in measures of healthy weight.

Children 6-17 years old who eat ready-to-eat cereal weigh less, have lower BMI percentiles and waist circumferences and are less obese than those who skip breakfast or eat other types of breakfasts.⁴⁷

▨ Other breakfast
 ■ Ready-to-eat cereal at breakfast
 ▨ Breakfast skipper

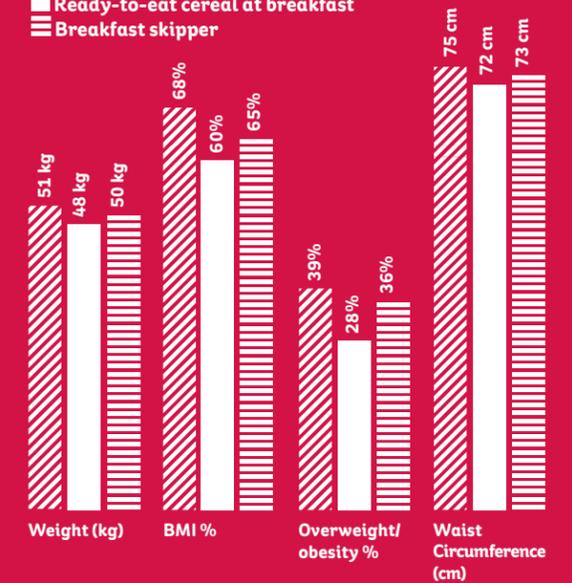
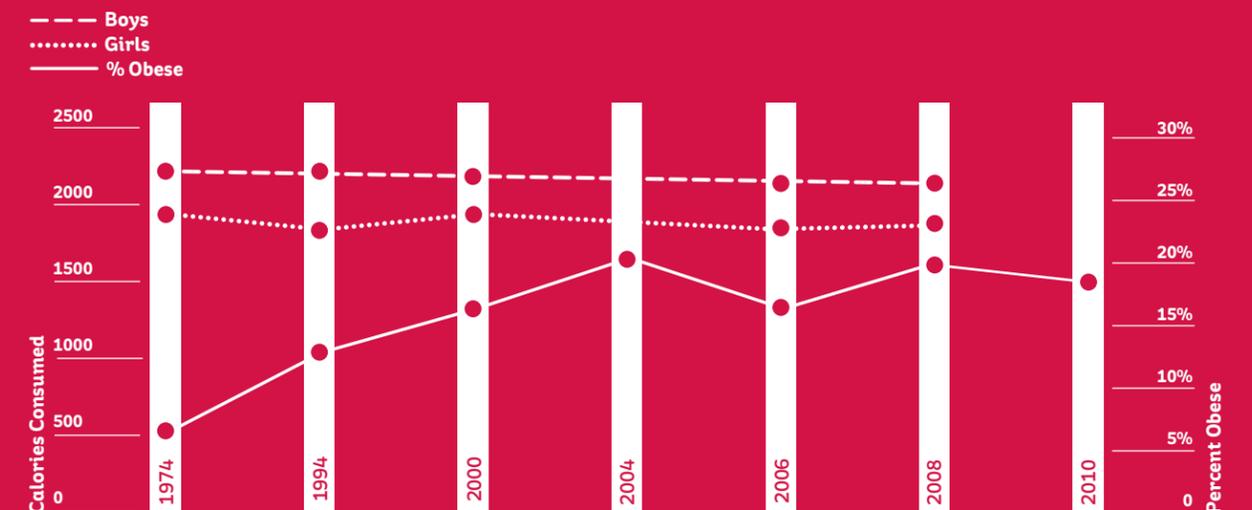


Figure 6

Calories and obesity.

While the number of calories U.S. children ages 6-11 have consumed for the past 30 years has remained relatively constant, incidence of obesity has climbed sharply, suggesting that greater focus on the "calories out" portion of the calorie balance equation is needed. According to a study by the Kaiser Family Foundation

and the Centers for Disease Control and Prevention, a child today is six times more likely to play a video game on a typical day than ride a bike, and children age 8-18 spend an average of 7 hours and 38 minutes a day watching television, playing video games and using computers.^{48,49}



The facts on breakfast cereals.

There has been a lot of misinformation communicated about breakfast cereals. Here are the evidence-based facts.

Putting sugar in perspective.

FACT: The amount of sugar contributed to the average diet from ready-to-eat cereal is small.

Breakfast cereals provide only a small proportion of the average person's daily intake of sugars. For example, breakfast cereal accounts for just 4% of daily added sugar intake in the U.S.¹⁸ and Australia.^{50,51,52} See Figure 7

FACT: Taste matters.

If the taste of a food is unacceptable, it will not be eaten, and if a food is not eaten, it cannot make a nutritional contribution to the diet. Sugars have been used for many years to add palatability to foods. They can improve the taste of nutrient-dense foods so people will eat them and get the nutrition they provide.

FACT: Children who eat cereal are eating well.

Eating ready-to-eat cereal (regardless of sugar content) is linked to a higher consumption of micronutrients and to lower fat, sodium and cholesterol intake. Children 4- to 18-years-old who eat presweetened cereals are more likely to meet recommendations for calcium and folic acid than children who eat non-cereal breakfasts.³

FACT: Cereal is no more likely than other breakfast foods to contribute to tooth decay.

The prevalence of dental cavities is unrelated to the consumption of cereal or cereal sugars.⁵³

FACT: There is no relationship between the sugar content of a cereal and its calories.

Many people assume that cereals with higher sugar levels are higher in calories. However, this is just not true. A recent Australian study compared 312 breakfast cereals and showed that the energy density of products with the lowest sugar content were virtually identical to those with the highest sugar content.⁵⁴

FACT: Taking sugar out of cereals does not typically reduce the calories.

A gram of simple sugar and a gram of starch each have the same value of 4 calories per gram. Removing a gram of sucrose lowers the sugar content by one gram, but usually does not affect the calorie level since the sugar is often replaced by one gram of starch to maintain texture.

The truth about sodium.

FACT: Breakfast cereal contains less than one-half the sodium of many popular breakfast items.

In a 10-year study, girls who ate cereal breakfasts consistently had lower sodium intakes than girls who ate other breakfasts.⁵⁵ Compare the typical values of some common breakfast items. See Figure 8

FACT: Cereal consumed at breakfast results in lower sodium intakes over the whole day.⁵⁶

In Australia, 8- to 12-year-old boys who ate breakfast cereal had lower sodium intakes than those who ate another type of breakfast or skipped breakfast.^{52,50}

FACT: Sodium from breakfast cereal contributes a very small percentage of the total sodium in the diet.

In the U.S. and Canada, it's only 2-3% of the total sodium in the diet,^{47,57} and in Australia, it's only 4% of total sodium intake in children.⁵⁸

FACT: The average sodium content of Kellogg's cereals is declining.

As part of our commitment to continue to improve the nutrition credentials of our products, between 2007 and 2010, Kellogg reduced the average amount of sodium per serving in our breakfast cereals by 13% in our core markets including the U.S., Canada, Mexico, the U.K., France and Australia.

Reformulating Kellogg's cereals.

Since 2007, we have reduced the amount of sodium, sugar and fats in hundreds of Kellogg's products worldwide and increased fiber in many of them.

Figure 7

Sugar per serving.



Figure 8

Comparison of sodium content.



Taking the lead on fiber.

One of the most beneficial nutrients in cereal grains is fiber, and Kellogg has been an advocate of higher fiber diets since introducing *Bran Flakes*, the first high-fiber cereal, in 1915.

Why health professionals recommend fiber.

Recent studies show that fiber may be beneficial in reducing the risk of many lifestyle-related diseases. Research suggests that fiber may:

- Help protect against colon cancer. Fiber is on the list of highly probable protective factors in the prevention of colon cancer.⁵⁹ In Europe, people with the highest intakes of fiber were shown to have a 25% lower risk of developing bowel cancer compared to those with the lowest intakes. And the effect appears to be stronger for cereal fiber than fiber from fruits, vegetables and beans.⁶⁰
- Reduce the risk of breast cancer. A recent epidemiological study found that premenopausal women who ate more than 30 g of fiber a day were 50% less likely to develop breast cancer, with cereal fiber offering the most protection.⁶¹ Another study

reported a 40% reduction in the risk of breast cancer in postmenopausal women with fiber intakes above 26 g per day.⁶²

- Be linked to a reduced risk of diabetes. People who regularly eat high-fiber diets are approximately one-third less likely to develop diabetes than those who eat low-fiber diets.⁶³
- Reduce coronary events by 40%.⁶⁴
- Be positively associated with longevity, according to a recent paper on dietary fiber intake.⁶⁵

Health Canada recently concluded that wheat bran is the best fiber to promote regularity.⁵⁹ A single serving of *All-Bran Original* cereal goes a long way toward meeting recommended daily fiber amounts.

Fiber in Kellogg's Cereals.

Kellogg is committed to providing great-tasting products that deliver the benefits of dietary fiber in convenient, nutrient-dense cereals that appeal to everyone.

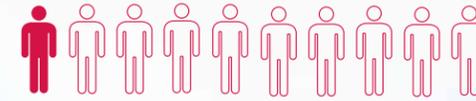
<i>Kellogg's</i> ALL-BRAN Original	<i>Kellogg's</i> FROSTED Mini-Wheats	<i>Kellogg's</i> Raisin Bran	<i>Kellogg's</i> All-Bran Sultana Bran	<i>Kellogg's</i> FROOT LOOPS	<i>Kellogg's</i> mini MAX
Provides 10 grams of fiber per serving*	Provides 6 grams of fiber per serving*	Provides 7 grams of fiber per serving*	Provides 10 grams of fiber per serving**	Provides 3 grams of fiber per serving*	Provides 3.5 grams of fiber per serving***

*U.S. Nutrition Facts **U.K. Nutrition Facts ***Australia Nutrition Facts

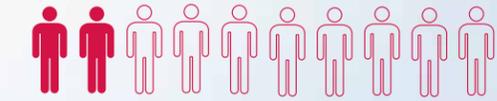
Few of us meet fiber recommendations.

With so much positive information about the benefits of consuming sufficient fiber, it is concerning to see that most people do not get enough of this important nutrient.^{66, 67, 68, 69, 70, 71}

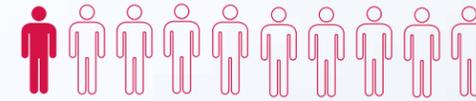
Only 1 in 10
people in the U.S.



Only 2 in 10
people in Ireland



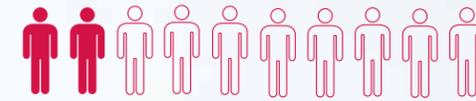
Only 1 in 10
people in Canada



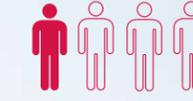
Only 1 in 2
children in Australia



Only 2 in 10
women in Mexico



Only 1 in 4
adults in France



Only 2 in 10
people in the U.K.



Steps toward sustainable agriculture.

Bringing people a better cereal is only part of the equation. By working to optimize grain farming, we can also help bring about a better world.

Improving interactions at every level.

As part of our corporate responsibility strategy, we strive to conduct business in a way that reduces our environmental impact. For the past several years, we've been engaging in ways to help address these key issues:

Environment – water use and carbon impacts of our products' agricultural ingredients

Marketplace – nutrition from grains and the sustainability of our agricultural supply chain

Community – building relationships with and supporting farmers and farming communities

Kellogg is also forming strategic partnerships with organizations at the leading edge of agricultural sustainability to broaden our own understanding, contribute to industry thinking and work to help the world to grow better grains in a more sustainable way.

“The food we eat—growing, producing and importing it—has a massive impact on the planet, from the Cerrado savannah in Brazil to the forests of Borneo. But you can help the environment by eating more fruit, vegetables and cereals—and less meat and processed food. And, of course, that’s better for you too.”

– World Wildlife Fund “Livewell” 2020 Principles

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