Although wheat farming in Eastern Washington started in earnest in the 1880s, it wasn’t until 1958 the state’s farmers saw the need for individuals to pool their resources to support the industry. That year, farmers created the Washington Grain Commission and voted to tax themselves on each bushel of wheat produced in the state. In the last five years, the WGC has devoted more than $25 million to wheat research, marketing and education.

The importance of wheat

There is more land planted to wheat in the world than any other crop. It provides 20 percent of the world’s caloric consumption, and for the world’s poorest 50 percent, 20 percent of their protein consumption too.

In Washington, for every dollar of income generated by wheat farming, 51 cents is earned by businesses that support farmers. Match that with the value of off-farm purchases by farmers and their employees and each wheat farming dollar generates an additional 98 cents of economic activity, much of it in rural areas where agriculture serves as a crucial anchor of small towns and regional economies. Eastern Washington’s 3,715 wheat farmers support another 3,406 off-farm jobs through the businesses that serve them. An additional 4,013 jobs are sustained by the personal spending of farmers, their families and employees for a total of 11,134 jobs that depend upon the state’s wheat crop.

The way of wheat

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There are no GMO (Genetically Modified Organisms) wheat varieties today, but an array of university researchers and private companies are working to develop the next generation of seed to feed the future. The vanguard of this effort could be on the market in less than a decade, which is important because in the next 30 years, two billion people will be added to the planet along with the need to feed them.

Norman Borlaug, father of the Green Revolution and winner of the 1970 Nobel Peace Prize said, “If the naysayers do manage to stop agricultural biotechnology, they might actually precipitate the famines and the crisis of global biodiversity they have been predicting for nearly 40 years.”

One of the earliest cultivated forms of wheat, **Einkorn** has 14 chromosomes. **Emmer** wheat, a later relative, has 28 chromosomes. Scientists believe emmer wheat crossed with a weed—**jointed goatgrass**—to create modern wheat’s 42 chromosome structure, including its unique gluten genes.

Biotechnology and wheat

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Wheat goes to boot camp

It takes upwards of 10 years for a wheat variety to move through the gauntlet of obstacles between the first cross to commercial production. During that time breeders observe and evaluate the performance of the variety in the field and test its quality in the lab. Because environment plays such a large role in wheat performance, it is important to measure each potential variety, called a line, across a number of years and a wide geographical region. In Eastern Washington wheat country precipitation can vary from as little as 8 inches to as much as 25 inches annually. When a breeder feels the line has met the challenges, it is entered into Washington State University’s Variety Testing Trials. There, the line spends three more years proving itself against dozens of other lines hoping to make it across the finish line to become a “named” variety.
There are many specialized flour comes in two types: refined kernel’s endosperm and does includes the endosperm, bran and the germ. In research studies, whole wheat is associated with: reduced risk of chronic diseases like diabetes and cancer, reduced risk of obesity, and better weight control. About 1 in 141 people—less than 1 percent of the U.S. population—suffers from Celiac disease, an autoimmune disease caused by a reaction to gluten protein found in wheat. Another 0.5 percent of the population suffers from non-celiac gluten sensitivity and about the same percentage have a wheat. For those few, eating wheat is unsafe. But for 98 percent of the U.S. population, products made from wheat flour are a nutritious and healthy food choice. What’s more, according to Consumer Reports, switching to a gluten-free diet may actually be harmful due to the extra fat, sugar and sodium added to products to compensate for their lack of taste and texture. Not to mention, many gluten-free foods are not enriched or fortified with essential nutrients such as folic acid and iron. The National Foundation for Celiac Awareness says, “eliminating gluten when people do not have a medical necessity for doing so is unwarranted.” Gluten-free products are definitely damaging to consumers’ pocketbooks, costing upwards of three times more than traditional wheat-based alternatives.

To inform future consumers about the benefits of wheat, the Washington Grain Commission funds Wheat Week, an educational program taught in elementary schools across Washington. The week long program teaches fourth and fifth graders the parts of the wheat kernel: bran, germ and endosperm, and the nutritious value of each while emphasizing the role of whole grain wheat in a well-balanced diet.

Answers on our website: www.wagrains.org
The six types of wheat

There are six market classes of wheat in the U.S., each with properties that millers and bakers use for specific products. Hard wheats, like hard red winter grown predominantly in the Midwest, and hard red spring grown throughout the Northern Tier states, are recognized as bread wheats. Soft white wheat, grown in the Northwest with a smattering of production in Michigan and New York, is recognized for its superior cookie and cracker performance in this country and steam breads, sponge cakes and noodles overseas. Durum wheat, grown mostly in North Dakota and the desert Southwest, is used to make pasta. Other wheat classes include soft red winter, grown east of the Mississippi River, and hard white wheat, which is used to make many whole wheat products.

Home of soft white wheat

Although wheat is also grown on the west side of the state, the majority of farms are concentrated east of the Cascade mountains. Eastern Washington farmers predominantly grow two kinds of soft white wheat. Common varieties have elongated heads. About 80 percent of Washington’s soft white crop in any year is planted to common varieties.

Club wheat migrated to the Northwest from South America and before that, Spain. It is even softer than soft white and has a unique compact head shape. Club wheat is super soft! Certain countries, especially Japan, buy club wheat in a 10 to 20 percent blend with common varieties creating the Western White wheat blend.

Wheat is a type of grass and Eastern Washington’s cool nights and warm days are ideal for its production. Although North Dakota recently overtook Kansas as the No. 1 wheat-producing state in the nation, neither has the diversity of climates that makes Washington so unique and where it’s possible for farmers to grow soft white wheat, hard red winter wheat, hard red spring wheat and hard white wheat.
A river of wheat

Farmers in wheat growing areas of the country served only by the railroad are called “captive shippers” because they have no other way to get their wheat to market and transportation prices are correspondingly high. Washington farmers aren’t captive because of the 360-mile long Snake/Columbia River system between Lewiston, Idaho and Portland, Oregon. Barge traffic on the river is the most efficient—and cleanest—form of transportation available. A tug pushing barges can haul a ton of wheat 576 miles on a single gallon of fuel, compared to 413 miles by rail and 155 miles by truck. And tugs have one-third the emissions of rail and one-twentieth the emissions of truck, per ton-mile. An average of 60 percent of Washington wheat moves by barge to Portland.

Two companies, Tidewater and Shaver, compete for farmers’ barging business.

Wheat Goes To Market

- **100-CAR TRAIN**
  - 350,000 bushel capacity
  - 355 mpg per ton*

- **RAIL HOPPER CAR**
  - 3,600 bushel capacity
  - 413 mpg per ton*

- **CONTAINER**
  - 750 bushel capacity

- **RIVER BARGE**
  - 122,500 bushel capacity
  - 576 mpg per ton*

- **FOUR-BARGE TOW**
  - 490,000 bushel capacity

*Amounts are miles per gallon carrying one ton of cargo.

Source: Texas Transportation Institute, Texas A&M University, for the US Maritime Administration

Top Ten Wheat-Producing Countries  2015/16*

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>MMT</th>
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<tbody>
<tr>
<td>1</td>
<td>EU</td>
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<td>2</td>
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<tr>
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</tr>
<tr>
<td>10</td>
<td>Turkey</td>
<td>19.5</td>
</tr>
</tbody>
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*Projected

Wheat that makes waves

In 2014/2015 the United States exported nearly 835 million bushels of wheat to 68 countries around the world. That’s almost 50 percent of the wheat produced in America. About 49 percent of U.S. wheat is exported from seven ports located in Washington and Oregon. Cargo ships known as bulk freighters transport 2.4 million bushels of wheat at a time to quality conscious customers in Asia, Latin America and North Africa. Smaller shipments of wheat leave the country in containers, those steel boxes used to transport goods around the world. Although a container only holds about 750 bushels of wheat, some buyers prefer smaller quantities of the highest quality wheat for specialized uses. Other millers in remote locations use containers because they also serve as convenient storage facilities.

Bells, whistles and wheat

BNSF, which dominates the rail shipping needs of Washington wheat farmers, has turned to shuttle train loading facilities as a more efficient method to move grain as inexpensively as possible. These facilities are set up to load 110 cars in 15 hours or less, and they move to market as a unit. Washington has four shuttle loading facilities. BNSF boasts a network of 233 shuttle loaders across the U.S., a 200 percent increase since 2000. Union Pacific, the other Class I railroad operating in Washington, does not have access to a shuttle train loading facility.

Moving Washington’s Grain from Field to Port

<table>
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<tr>
<th>Percent of Crop by Mode</th>
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<tr>
<td>Truck/Barge..................55%</td>
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<tr>
<td>Rail/Barge..................5%</td>
</tr>
<tr>
<td>Rail.........................30%</td>
</tr>
<tr>
<td>Truck to final market........8%</td>
</tr>
<tr>
<td>Other.........................2%</td>
</tr>
</tbody>
</table>

Rank MMT

1 EU................. 155.3
2 China.............. 130.0
3 India.............. 88.9
4 Russia............. 61.0
5 US................. 55.8
6 Australia......... 27.0
7 Ukraine........... 27.0
8 Canada............. 26.0
9 Pakistan.......... 25.0
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*Projected
Glossary

All-purpose flour—A combination of hard and soft wheat with the strength and tenderness that can be used to make everything from quick breads to delicate cakes.

Annual cropping—Land in higher precipitation regions planted yearly, usually in a rotation with other crops.

Bleached flour—Any refined flour with a whitening/aging agent added.

Bran—The fiber rich outer layer of the kernel included in whole wheat products.

Dryland farms—Farms that depend on rain or snow for moisture. Most wheat farms in Washington are dryland.

Endosperm—The part of a seed that serves as the food source for the developing plant embryo, contains starch with protein and other vitamins and minerals.

Enriched flour—Flour with specific nutrients returned to it that were lost while being milled. Restored nutrients include folic acid, riboflavin, niacin, thiamine and iron.

Germ—The part of the seed that will germinate.

Gluten—A protein in wheat, barley and rye that is formed from two proteins—gliadin and glutenin—when water is added. Provides elasticity to dough and is essential for allowing bread to rise.

Head—The top portion of the wheat plant where seeds develop. Other portions of the plant: stem, leaves, crown and roots.

Lodging—The word farmers and researchers use to describe wheat that has fallen over due to root disease or weather or both.

Refined flour—Flour made up of the wheat kernel’s endosperm.

Soft or hard—Refers to the density of the wheat kernel.

Summer fallow—Land in the intermediate to drier areas that is rested for a year to allow moisture to accumulate before planting.

Whole wheat flour—Includes all parts of the wheat kernel—bran, germ and endosperm—shown to be particularly healthful.

For more information about wheat:

Washington Grain Commission (WGC) www.wagrains.org
WGC is a Spokane-based state agency created by wheat farmers in 1958 as the Washington Wheat Commission. The name was changed to the WGC when barley was brought under the organization’s auspices in 2009. Ten members (seven farmers, two industry representatives and a WSDA official) sit on the board.

Washington Association of Wheat Growers (WAWG) www.wawg.org
WAWG is an association of the state’s wheat farmers working to improve Washington’s wheat industry. WAWG is active in legislative efforts on the state and national level and helps to administer wheat industry programs funded by the WGC.

Wheat Life www.WheatLife.org
Wheat Life is a monthly magazine of WAWG which chronicles the agricultural, political and cultural life of farmers, their landlords, agricultural businesses and other links in the grain chain. Past issues can be found online at WheatLife.org.

National Association of Wheat Growers (NAWG) www.wheatworld.org
A grassroots organization representing wheat farmers in 25 wheat producing states, including Washington, NAWG is active in lobbying for strong U.S. wheat and agricultural policies.

Washington State University (WSU) www.wsu.edu
A land grant institution established under the Morrill Act of 1862 and signed by Abraham Lincoln, WSU was founded in Pullman in 1890. It is responsible for much of the state’s wheat research and breeding.

Agricultural Research Service (ARS) www.ars.usda.gov
The ARS is an agency of the U.S. Department of Agriculture (USDA). In the Northwest, the ARS is based on WSU’s Pullman campus. In addition to breeding club wheat, ARS scientists research regional disease and pest issues of wheat.

Wheat Marketing Center, Inc. (WMC) www.wmcinc.org
Through on-site research working hand-in-hand with international cooperators, the Portland-based WMC aims to increase U.S. wheat in foods around the world.

U.S. Wheat Associates (USW) www.uswheat.org
The export arm of the American wheat farmer, USW promotes U.S. wheat through funding provided by wheat farmers across the nation, including Washington, and federal funding through the Market Access Program and Foreign Market Development program.

Washington Wheat Foundation (WWF) www.wawheat.org
The WWF advances the small grain industry by building support through programs, activities and research that advances the industry and increases public awareness.

Wheat Foods Council (WFC) www.wheatfoods.org
The WFC is a partnership of wheat farmers, millers, bakers and end use manufacturers dedicated to increasing domestic consumption of wheat-based foods through information, education and promotion programs. Gluten facts can be found on the WFC website.

Washington State Department of Agriculture (WSDA) http://agr.wa.gov
The WSDA is a state agency headquartered in Olympia. It has employees in every county in the state carrying out activities that support farmers, distributors and consumers of Washington’s food and agricultural products. The federal government has authorized the WSDA to inspect grains for export through its Grain Inspection Program.

Home Baking Association (HBA) www.homebaking.org
HBA is a non-profit organization with the mission of growing the practice of home baking by sharing tools and knowledge with current bakers as well as future generations.