Montana Student Ag Mag

# WHEAT

Montana producers do indeed help to feed a hungry world, and most uniquely, Montana is a one-stop wheat shopping center for foreign buyers. Montana is the only place that has commercial production of five of the six major classes of wheat grown in the U.S. – Hard Red Winter (HRW), Hard Red Spring (HRS), Hard White (HW), Durum, and Soft White (SW). The one we do not grow is Soft Red Winter (SRW). In the U.S. wheat varieties are classified either as "winter" or "spring" wheat, depending on the season each is planted. Winter varieties are sown in the fall and are usually established before the cold weather arrives. Winter wheat goes dormant over the winter and then re-emerges in the spring, turning the fields green early on! Spring varieties are sown in the spring. Both winter and spring wheat are harvested in the fall.

## Montana Wheat Varieties

Hard Red Winter

Hard Red Spring

Hard White

Soft White

Durum

A one bushel container equals 1.244 cubic feet. The weight of one bushel can vary depending on moisture content, the standard weight per bushel is 60 pounds. This is the weight of a bushel at the standard moisture content of 13.5%. Montana, in the past ten years, has produced an average of 150 million bushels of wheat each year. Do the math, roughly how many pounds of wheat does Montana produce each year?

One bushel of wheat makes about 70 loaves of bread! Using the information to the left determine how many loaves of bread could be made with the wheat Montana farmers produce in one year?

More foods are made with wheat the world over than with any other cereal grain. Food is not the only thing made with wheat. Cosmetics, pet food, soap, trash bags, concrete, paste, alcohol, and many more items are made of wheat. Think dinnerware, disposable plates and bowls are made of wheat straw which makes this dinnerware a cinch to compost. Think green, think wheat!

## IN THIS ISSUE.....


***A Year's Journey with Wheat *Wheat Processing *Milling History *Safety *Careers * Nutrition * Know your Farmer**

# A Year's Journey with Wheat .....

## January
## February
## March

Farmers look out to snow on the fields, which adds moisture to the soil. Under the snow, winter wheat which was planted last fall lies dormant. It is common to see wildlife in wheat fields this time of year, many species depend on grains left in the fields for winter food.

Any wheat which was not sold last year is being marketed. Montana wheat is marketed all over the world, the majority of Montana wheat is sold to Pacific Rim countries. Many organizations play a role in keeping Montana's wheat production and marketing at its peak. The Montana Wheat and Barley Committee encourages scientific research to improve production and quality, maintains current grain markets, promotes new market development, and serves as an educational and informational resource. The Grain Growers Association, commercial marketing firms, cooperatives, elevator companies, and many other entities assist with marketing and state and national issues concerning wheat production and sales.

On the farm in the winter, farmers are busy working on equipment. Key partners in keeping the equipment in top running condition are the equipment dealerships and their parts and service departments (pictured are Zane Obergfell of Torgerson Equipment and Justin Haverluk of Moodie Implement.)

## April
## May
## June

Farmers watch as winter wheat begins to turn green and grow in the fields. Spring wheat varieties are planted in early spring. Insects and diseases are carefully monitored in the late spring and early summer. Diseases such as wheat stem rust and wheat stem sawflies cause millions of dollars of damage to crops each year. Researchers at Montana State University (Ryan Bixenmann of MSU pictured) and other research facilities work on ways to help farmers control pests. Wheat stem sawflies lay their eggs inside the wheat stems as the wheat is growing in early summer. The eggs hatch inside of the stem and the larvae will live all summer inside of the stem eating the inside of the plant. At the end of the summer, sawflies will cut the shaft of a wheat plant, causing the top of the plant to fall to the ground. The sawflies, which are not actually flies but are more closely related to bees and wasps, enters the lower portion of the wheat shaft which is still attached to the roots. The next spring inside of the stubble, the sawfly larva will pupate (like a butterfly) and then come out of the stubble as an adult sawfly. Researchers at Montana State University are working on trap crops to help farmers with sawflies. Trap crops are planted around the outside perimeter of wheat fields to attract the sawflies, which then lay their eggs in the shaft of the trap plant instead of the wheat, saving the wheat from damage. Many grasses and other plants such as wild oats, other attractive wheat varieties, and wild grasses are being tested as trap crops for wheat.

## July
## August
## September
## October

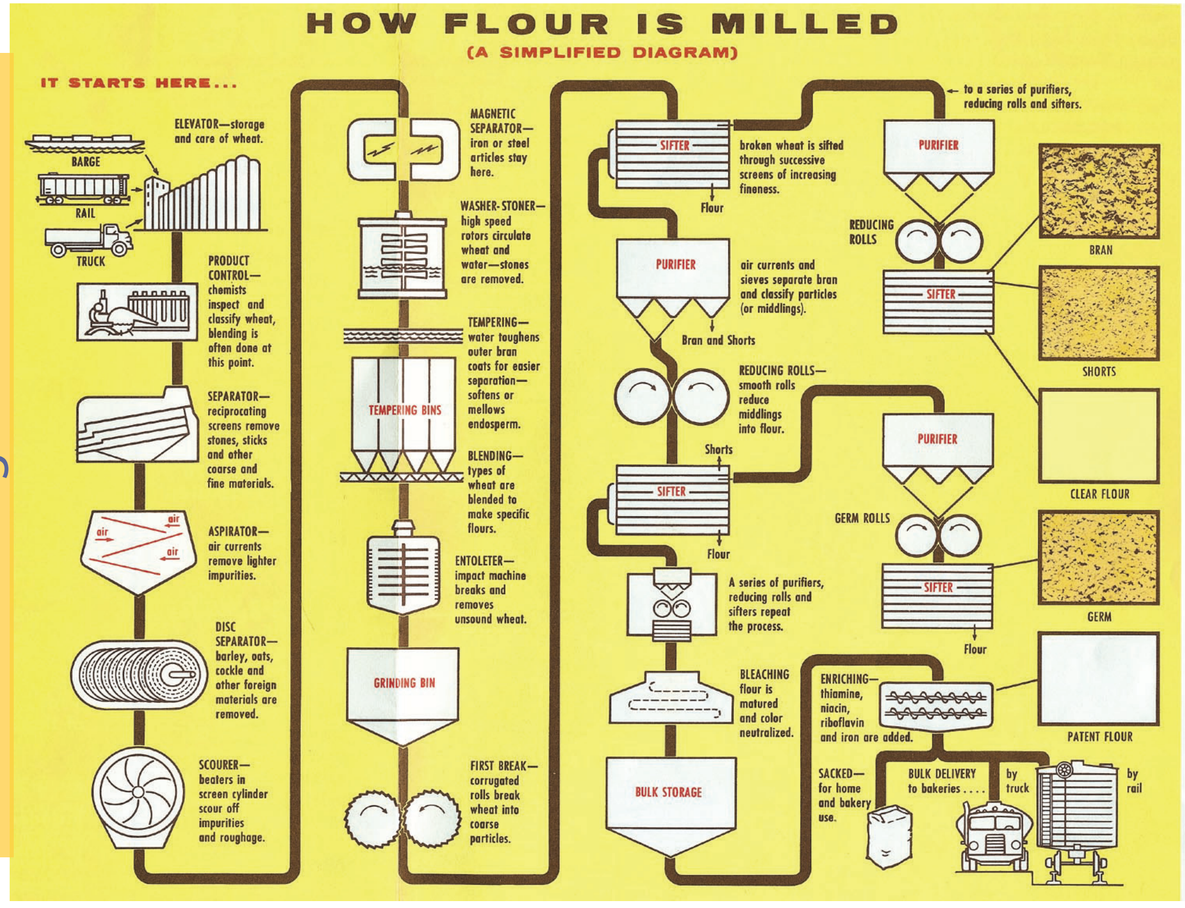
Grains begin to ripen during the hot months of July and August. Farmers check their wheat often for development and maturity. Harvest begins as soon as the grains ripen, and the moisture content in the grain kernels falls to approximately 13.5%. It is all hands on deck when the grain is ripe, farmers try to harvest their grain at exact times, when the grain is at its prime. Long dry summer days are perfect for harvesting wheat in Montana because the grains stay dry. If it rains harvest is postponed until the wheat dries again. The shafts are cut and threshed (this process knocks the wheat seeds, also called wheat berries, into a bin on the combine). The long seedless shafts are left lying on the ground. Many farmers bale the wheat stem shafts (called wheat straw). Examples of wheat straw uses at left. The harvested grain is taken to the elevator. Elevators buy local grain from farmers and sell the wheat globally. At the elevator, grain is loaded into rail cars by a shuttle loader for shipment to processing centers and often times to sea ports for shipping to other countries. A full grain train has 110 rail cars full of wheat; it takes the shuttle loader 24 hours to fill 110 cars. Ships transport the grain to other countries, Montana grain is highly desirable in the Pacific Rim countries. A full ship load of grain is 3 train loads of grain, or 330 cars full! Not all grain is shipped and sold at harvest, marketing wheat occurs all year long. If the rainy weather continues at harvest time, wheat berries can sprout on the shaft, essentially ruining the whole crop.

## November
## December

With the wheat out of the fields, farmers are busy marketing and selling the wheat that they have left, and are also seeking contracts for selling next year's wheat crops. The wheat kernels are now in milling plants being made into foods that we can eat such as bran, flour, and germ.

The bales of wheat straw that were left over after threshing have many purposes including animal feed and bedding, cat litter, biofuels and biomass, paper and packaging, house construction, and straw hats! Straw that was not baled is left in the field to add organic matter to the soil.

# Processing Wheat.....




**Bran** is the outer layer of the wheat kernel, often used for animal feed. It also makes a nutritious addition to baked goods, because it is a good source of fiber and is high in B vitamins, protein and iron.

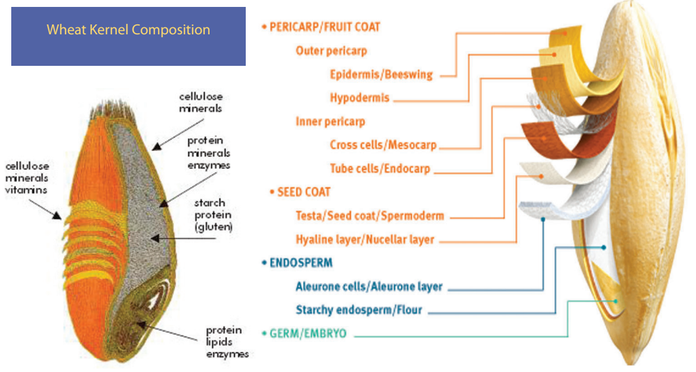
**Shorts** consist of the fine bran particles, germ and a small portion of floury endosperm particles as separated in the usual processes of commercial flour milling.

**Clear** flour is the by-product of straight flour that remains after patent flour is removed. Clear flour is graded into fancy, first clear, and second clear. Clear flour is darker in color than the other flours previously mentioned, as it is made from the part of the endosperm closest to the bran. Fancy clear flour, milled from soft wheat, is used to make pastry flour. First clear, milled from hard wheat, is often blended by the baker with low-gluten flours to lighten the texture of breads such as rye or whole-wheat yet maintain the deep color desirable in such breads. Second clear flour has a very high ash content, is very dark, and is not generally used for food.

**Germ** is the inner embryo of the wheat kernel. It is nutrient rich; a good source of dietary fiber, protein, vitamin B6, foliate, magnesium and copper, and a very good source of thiamin, phosphorus, zinc, manganese and selenium.
Read more http://nutritiondata.self.com/facts/cereal-grains-and-pasta/5743/2#ixzz1lAfoJWjq

**Straight** flour is considered a good flour to use for bread making. It is 100 percent extraction flour. The extraction rate is the amount of flour obtained from wheat after milling, when the bran and germ are removed, leaving the endosperm, which contains most of the protein and carbohydrates. For example, based on 100 pounds of wheat, approximately 72 pounds of flour remains after extraction; the other 28 pounds is used for feed. The entire 72 pounds or 100 percent, of the remaining flour is straight flour. Straight flour is used to make patent, clear, and low-grade flours.

**Patent Flour** is the purest and highest-quality commercial wheat flour available. Patent flour is made from the center portion of the endosperm. Patent flour contains 60 to 70 percent straight flour. Short patent flour made from hard wheat is the most highly recommended commercially milled flour for bread baking, it contains 70 to 80 percent straight flour.



From hand grinding stones to large factory milling machines, humans have invented new ways to grind grains for cereal and bread flours over the centuries. These photos represent some of the inventions in grain grinding history.

World's Oldest Cooked Cereal Was Instant Jennifer Viegas,, Discovery News. October 24, 2008: European diners around 8,000 years ago could enjoy a bowl of instant wheat cereal that, aside from uneven cooking and maybe a few extra lumps, wasn't very different from hot wheat cereals served today, suggests a new study that describes the world's oldest known cooked cereal. Dating from between 5920 to 5730 B.C., the ancient cereal consisted of parboiled bulgur wheat that Early Neolithic Bulgarians could refresh in minutes with hot water. "People boiled the grain, dried it, removed the bran and ground it into coarse particles," lead author Soultana-Maria Valamoti told Discovery News. "In this form, the cereal grain can be stored throughout the year and consumed easily, even without boiling, by merely soaking in hot water," added Valamoti, an assistant professor of archaeology at Aristotle University of Thessaloniki in Greece.

# SAFETY!

Grain, which is usually stored in a silo, is often an underestimated danger. Anyone can become trapped and suffocate under the shifting surface of stored grain or in flowing grain that is being sucked out of the silo, truck, or pile! Grain dust is also higly explosive! An average of 10.6 agricultural grain dust explosions are reported per year in the U.S. resulting in 1.6 deaths, 12.6 injuries and millions of dollars in damages (Schoeff, 2006).

To prevent injuries from grain entrapment, never enter a grain storage container, rail car, or silo and do not ride in grain wagons. In addition, if someone is trapped in a silo, never enter to help — instead call an adult or dial 911 or your local emergency number immediately.

# CAREERS!

Dustin was raised on a cow/calf ranch in remote eastern Oregon, driving 40 miles each way to attend high school. After high school he attended college at the University of Idaho, Moscow, studying ag business and animal sciences. Dustin is extremely happy with his education, noting that the University of Idaho's focus on trading, commodities and the chance to work with the Chicago Board of Trade during college were instrumental in his success after college. Dustin began his internships in his sophomore year of college with Gavilon in Omaha, Nebraska. Gavilon is a commodity management firm. Dustin received an internship the next year with Columbia Grain at their office in Lewiston, Idaho. After graduating with a degree in ag business Dustin was employed with Columbia Grain, a company he is very proud to work for. His job with Columbia Grain began with marketing wheat, which took him to Minneapolis where he met with large companies such as General Mills, ConAgra, Vitera, and other flour milling associations. Dustin has since moved into marketing pulse crops like peas and lentils. Pulse crops are also marketed all over the world, taking Dustin to a nutrition conference in Chicago and to a meeting with buyers in Dubai! Dustin's excellent advice to students is, "Fit everything you possibly can into your college schedule, from sports to service. The more you do, the brighter your future!"

Dustin Kreger is a Grain Merchant for Columbia Grain in Great Falls, Montana. Columbia Grain is owned by the Marubeni Company, which has offices all over the world. Columbia Grain functions as a commodity marketing and export company in the northern tier of the U.S., serving Montana, North Dakota, Washington, Oregon, and Idaho. Their shipping facility is in Portland, Oregon and can be seen inside this publication; July - October section.

Internet Resources
Wheat production and processing: http://www.beagsmart.org/video/just-for-kids-wheat.html

Montana Education Standards for this publication can be found by visiting: agr.mt.gov

Want to learn more about Montana wheat and wheat nutrition? Visit: http://agr.mt.gov/agr/Programs/AgClassroom

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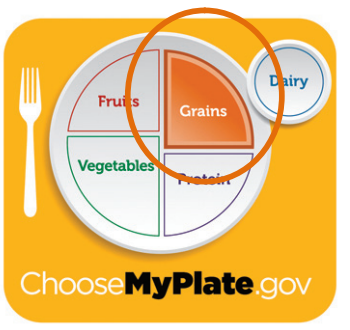
# NUTRITION




Once it is consumed, wheat energizes the body, delivering essential nutrients to its cells. Grain products, whole or enriched, are a premier source of energy-providing carbohydrates and a good source of fiber, the major B vitamins (thiamin, niacin and folic acid) and iron.
MyPlate Dietary Guidelines recommend Americans consume six ounces of grain foods such as bread, cereal, rice and pasta each day (depending on age, gender and activity level), with at least half of them coming from whole grain foods.

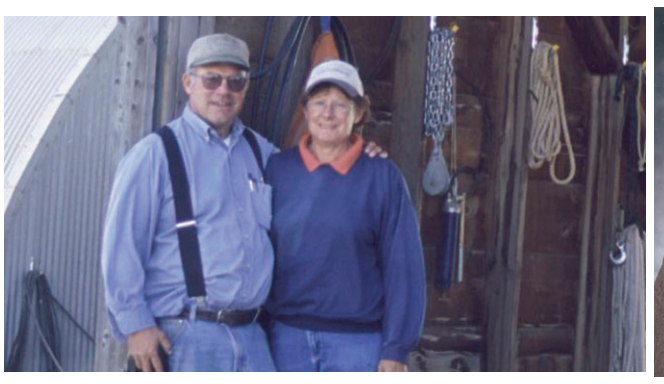
WHOLE GRAINS AND REFINED GRAINS

Whole grains contain the entire grain kernel: bran, germ, and endosperm. Examples of whole grains are: whole wheat flour, oatmeal, bulgur, and brown rice. At least half of your daily grain servings should be whole grains.

Refined grains have been milled, a process that removes the bran and germ. This is done to give grains a finer texture and improve their shelf life, but it also removes dietary fiber, iron, and many B vitamins. Examples of refined grains are white flour, white bread, and white rice. Source: MyPlate.gov

# KNOW YOUR WHEAT FARMER

Featured in this issue: Mattson Farms



Mattson Farms is located in the Northern Tier of the Golden Triangle in Montana. This area is renowned for its ability to produce high quality, whole wheat grains that have remarkably high protein content.

Since 1911 our farm has been 100% family owned and operated. Our vision is to remain a family farm of sufficient size and scope for inter-generational transfer that provides a comfortable living and working atmosphere for owners and employees.

We also recognize and accept our responsibility both socially and morally to our neighbors, our community, and our environment.

This publication was made possible by the Montana Wheat and Barley Committee and the Montana Agriculture in the Classroom program
http://agr.mt.gov

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