

## Where Does All That Corn Go?

Illinois farmers rank second in the country in corn production. In 2009, Illinois farmers planted 12,000,000 acres of field corn, which produced over 2 billion bushels of little golden kernels. One bushel of corn weighs 56 pounds, meaning Illinois farmers hauled over 112 billion pounds of corn out of their fields. Now that is a lot of corn!

Where does it all go? Field corn is not the type of corn you eat on the cob. It is a special type of corn that has a hard outer shell and is full of starch. It is processed to make products you use every day. Processing means changing field corn into different usable products through a series of events. The corn is soaked and milled (ground) so that the germ oil, starch, gluten and hulls can be separated. These items are then made into cornstarch, cooking oil, sweeteners, high fructose corn syrup, cereal, beverages and fuel. And that's just the beginning!



# Ethanol Hits a Homerun



Ethanol is a high-performance fuel made from corn. Most gas stations sell gasoline that is mixed with ethanol. How do you know which gasoline at the station has ethanol in it? Just look for the sticker on the fuel pump that says “10% ethanol.” Some vehicles now use fuel mixed with 85% ethanol or E-85. These vehicles have a yellow gas cap to let the driver know that they can use gasoline mixed with more ethanol.

So why is it important for us to use this fuel made from corn? Ethanol is better for the environment. Here's how:

- Highway vehicles are responsible for 17% of air pollutant emissions. Ethanol helps to reduce these up to 29%.
- Ethanol is a renewable resource. When we need more fuel, we grow more corn. Can you name other renewable resources?
- Ethanol is biodegradable and does not pollute groundwater.
- Gasoline is made from crude oil, which is made from plants that died millions of years ago. It is not a renewable resource, and once we have used it all, it is gone. When we mix ethanol with gasoline, it makes Earth's limited supply of crude oil last longer.
- The production and use of 10.75 billion gallons of ethanol in 2009 reduced demand for imported oil by 364 million barrels, at a savings of \$21.3 billion.



Illinois corn farmers invest in a program called the Illinois Corn Checkoff. This program pools money from Illinois corn farmer families to help fund projects such as The Corn Crib, the stadium for The CornBelters, Normal, Illinois' semi-professional baseball team. Here, Illinois corn farmer families have the opportunity to interact with other families to share information about corn, Illinois' top agricultural commodity. For more information, visit: [www.ilcorn.org](http://www.ilcorn.org) or [www.normalbaseball.com](http://www.normalbaseball.com).

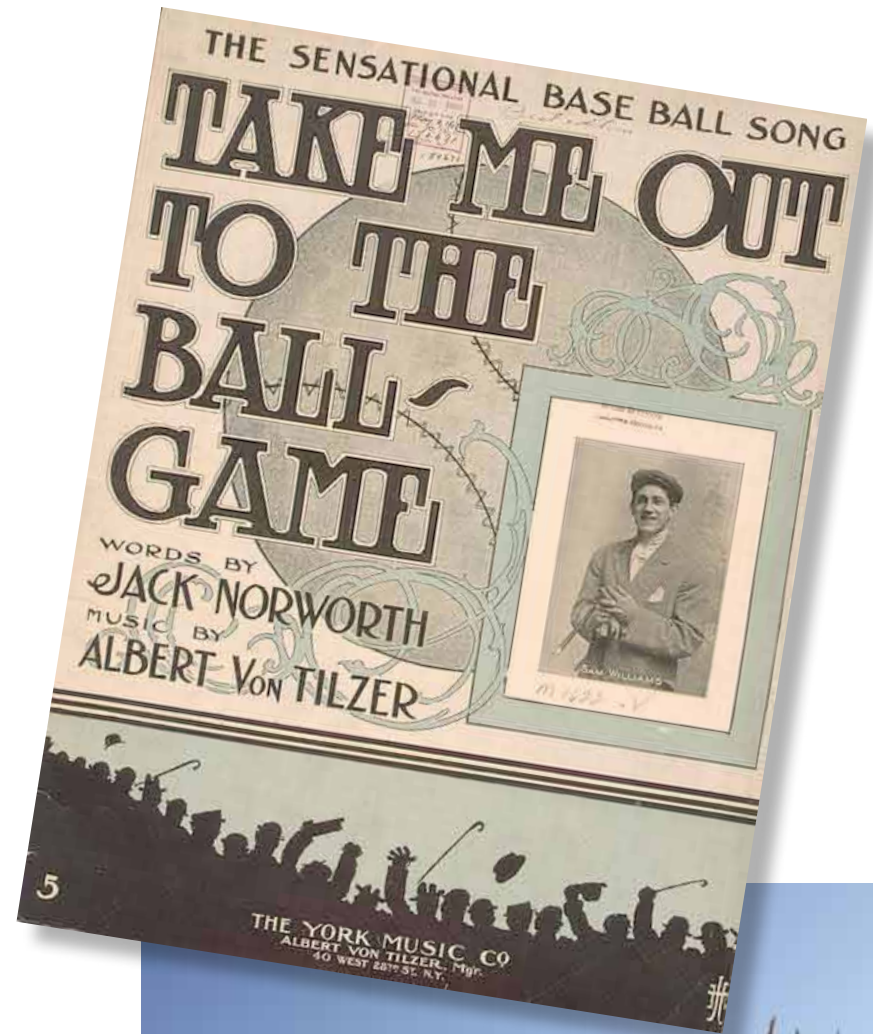




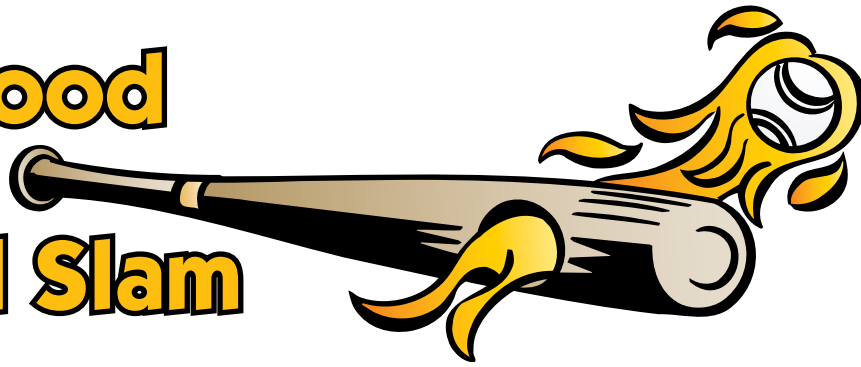
# 7th Inning Stretch!

Here are some quick facts that will have you singing all day long!

- The CornBelts baseball field is approximately 3 acres.
- During the time it takes for a player to steal from first to second, the average Illinois corn farmer can plant almost 1,000 corn plants.
- A “can of corn” in baseball is a soft or high fly ball that is easily caught by an outfielder.
- If we grew corn on the baseball field, we could produce about 13 tons of corn in one year.
- 90% of all corn produced in the United States is produced by family farms.
- America’s corn farmers grow 20% more corn per acre than any other nation.
- The United States produces about 40% of the world’s corn.
- One acre of corn removes about 8 tons of carbon dioxide from the air in a growing season, which is more than that produced by your car annually. At 180 bushels per acre, enough oxygen is produced to supply a year’s needs for 131 people.
- American farmers grow 5 times more corn than they did in the 1930s on 20% less land.



# This Food is a Grand Slam



Can you find corn at the baseball stadium concession stand? Would you look for corn on the cob? Or a can of corn? How about a bag of frozen corn? That kind of corn is called **sweet corn**. It's the kind of corn that is grown in gardens. You probably won't find it at the concession stand.

You may find popcorn at the baseball stadium. That's right, **popcorn** is another type of corn that we eat. There is a little bit of water in every kernel of popcorn. When the kernel is heated, the water heats and builds up pressure. The pressure makes the water take up all the available space. When enough pressure builds up, the kernel pops and turns inside out.

There is another kind of corn that you can find at the food stand. It is called **field corn or dent corn**. Most of the corn grown in the United States is field corn. This type of corn is a grain and used to feed animals and make products like glue, sandpaper and medicines. You eat products made from field corn, too. It is made into corn sweetener, starch, meal and oil. These are important ingredients in foods that we eat every day.

Put a check by all the concession stand foods you think are made with corn.

- |                                       |                                       |                                     |
|---------------------------------------|---------------------------------------|-------------------------------------|
| <input type="checkbox"/> Soda Pop     | <input type="checkbox"/> Hot Dog Buns | <input type="checkbox"/> Nachos     |
| <input type="checkbox"/> Popcorn      | <input type="checkbox"/> Ketchup      | <input type="checkbox"/> Bubble Gum |
| <input type="checkbox"/> Candy Bars   | <input type="checkbox"/> Mustard      | <input type="checkbox"/> Corn Chips |
| <input type="checkbox"/> Potato Chips | <input type="checkbox"/> Cookies      | <input type="checkbox"/> Ice Cream  |

Did you check everything on the list? That's right! All of these foods are made with corn sweetener, starch, meal or oil. There are more than 4,200 uses for corn with more found every day!



**Popcorn**

**Sweet Corn**



**Field Corn**



**FOOD**

**CORN** is an ingredient in many food items like cereal, peanut butter, snack foods and soft drinks.

**CORN  
COVERS  
ALL  
THE BASES!**

**It's a homerun!**



**FEED**

More than half of the U.S. **CORN** crop is used as feed for livestock.



**FUEL**

One acre of **CORN** can produce enough ethanol to run a car for some 72,000 miles on E-10 Unleaded.

# What's Inside That Seed?

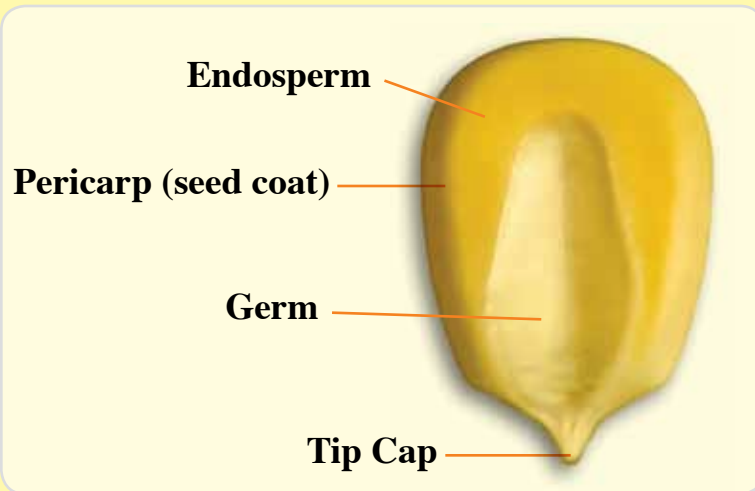
Corn seeds are called kernels. One ear of corn averages 800 kernels in 16 rows.

**Endosperm**—Holds the energy and protein the new plant will use to begin to grow. This area is full of starch, which is used the most in corn processing.

**Pericarp** (seed coat)—Outside cover of the seed. It protects the inside of the seed from cold temperatures, moisture and insects until the seed is ready to germinate.

**Germ**—Only living part of the seed. It will become the new plant. It has all of the genetics, vitamins and minerals for a new plant to be created. There is also oil inside of the germ, which is the most valuable part of the corn kernel when it is processed.

**Tip Cap**—Where the kernel was attached to the cob. As the kernel grew on the cob, it took in water and nutrients from this area.



## One Bushel of Field Corn Provides:

**31.5 lbs** of starch or **33 lbs** of sweetener or **2.8 gal** of ethanol (fuel)



**Plus**

**17.5 pounds** of distillers dried grains

**13.5 pounds** of gluten feed

**2.6 pounds** of gluten meal

**1.5 pounds** of corn oil

There are 27,000 kernels in one bushel of corn. 170 baseballs will also fit in one bushel.





# Transportation and the World Market

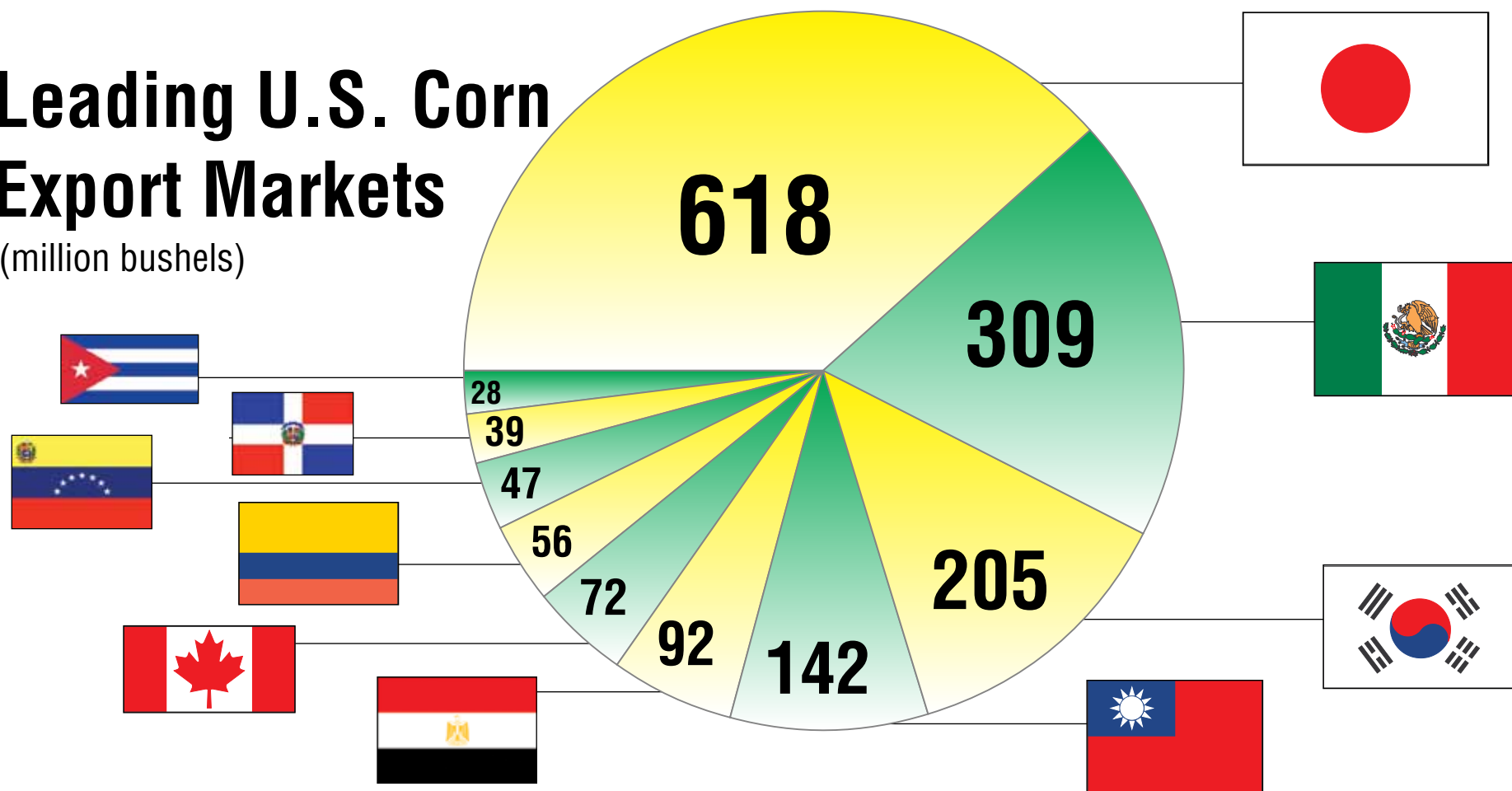
Illinois and the United States are great places to grow corn. We actually grow more than we can use. We sell this extra corn to other countries. This is called exporting. The Mississippi River plays a very important role in the exporting of Illinois corn and other commodities. Corn can be loaded onto large, flat boats, called barges, and shipped south, down the river to New Orleans, cheaper than if it was hauled by semi trucks or trains. Once in New Orleans, the corn is loaded into large ships and sent around the world.

The graph to the right shows the top ten countries that buy U.S. corn. Can you identify each of the countries by their flag? Then see if you can find them on the world map and choose a route that might have been taken to deliver corn grown in Illinois to each country.



# Leading U.S. Corn Export Markets

(million bushels)





# Plant to Plastic in No Time Flat

Pretend that you are at the baseball stadium and you just finished drinking a soda. What would you do with the cup and straw? You would probably throw it away, right? Most Styrofoam cups and plastic straws end up in landfills. As a nation, we add 135 million tons of these products to our landfills each year.

Petroleum based plastics are made from a material that is formed as a by-product of refining crude oil and natural gas. The process to get this material produced and to turn it into plastic produces large amounts of greenhouse gases. Also, 200,000 barrels of oil a day are needed to make plastic containers used for food packaging and consumer goods.

Corn plastic is a more environmentally friendly plastic than that made from petroleum. A resin is the base of the type of plastic that is made using only corn. The kernels are milled and sugar is extracted from the milled corn. The sugar is then allowed to ferment, producing a resin as a by-product. Producing corn plastic generates 68% less greenhouse gases and no toxins since it is made from corn. It is also completely biodegradable. Biodegradable means that it breaks down into little pieces that become part of the soil, instead of adding to our landfills. Styrofoam and petroleum-based plastic products are not biodegradable.

There are a lot of things made from plastic including shopping bags, trash bags and packing peanuts. Some grocery stores and food processors use corn plastic packaging for their fresh food items. Some food stands use plastic forks, knives and spoons made from corn. Today, some brands of carpet and the stuffing in pillows and bed comforters are sometimes made from corn plastic that has been spun like cotton.



## Use Corn To Make Your Own... Biodegradable Plastic

1. Place a tablespoon of cornstarch in a plastic zipper-seal bag.
2. Add 2 drops of corn oil to the cornstarch.
3. Add 1 ½ tablespoons of water to the oil and cornstarch. Seal the bag.
4. Mix the cornstarch, oil and water in the plastic bag by rubbing the outside of the bag with your fingers.
5. Add 2 drops of your favorite food coloring to the mixture and mix well. DO NOT completely seal the bag.
6. Place the bag in a microwave oven for 20-25 seconds on high. Be careful. It will be hot.
  - What happens to your plastic?
  - Form your plastic into a ball while it is still warm and describe what it does.
7. Record your scientific observations.
  - What do you notice about your biodegradable plastic?
  - Is your biodegradable plastic the same as your classmates' plastic?
  - What could you make with this biodegradable corn plastic if you let it harden? Remember, it will dissolve.
  - Compare your biodegradable plastic with the plastic zipper-seal bag.

# Most Valuable Players

## Donald Furrow

### Pitcher

#### Normal CornBelters

Normal, IL

#### *How do you prepare physically for a game?*

Being a pitcher, leg strength, core strength and arm care are the most important things. I work out and throw everyday and complete an arm care workout right before or after throwing. Every night before bed, I do an abdominal workout and I do pushups when I wake up each morning.

I try to get six meals a day, consuming as much protein and carbohydrates as I can. I also try to drink as much milk and water throughout the day as my body can hold. I stay away from fast food and sweets with the exception of Dr. Pepper. It was created in Texas, afterall, and is made with corn syrup!

#### *What advice would you give to younger athletes who are just starting to participate in sports?*

Have fun and don't get frustrated if you aren't getting better as quickly as you think you should. Being good at a sport isn't an overnight thing. It takes a lot of hard work, dedication and desire. The more work, practice and heart you put into playing, the greater the reward will be in the end. The key is to put down the video games and be active.

#### *Why is a healthy diet, including products made from corn, important when participating in sports?*

Corn is the single most important agricultural product in the world and is in most of the meals you eat. The healthier you eat and the less junk food and sweets that you put into your mouth, the better your body and mind will perform in sports and in the classroom. If you only eat junk, your muscles won't grow, your bones won't be strong, your vision won't be sharp and your brain function won't be up to speed.





# Most Valuable Players

## Donna Jeschke

### District V Director

### Illinois Corn Marketing Board

Mazon, IL

#### *Tell us about your farming operation and your involvement with the Illinois Corn Marketing Board.*

My husband and I, together with our sons and my brother's family, grow corn and soybeans on our family farm. Our farm is located about 75 miles southwest of Chicago, IL. Together with 14 other corn farmers, I represent Illinois corn producers on the Illinois Corn Marketing Board. As past chairman of the ICMB, I have had many opportunities to visit with farmers, and other people involved in agriculture, from around the world. Many of these people have visited our home where they can see how we grow corn for food, animal feed, fuel and other products such as biodegradable corn plastics.

#### *What new and exciting things are happening in the corn industry today (locally or nationally)?*

I am very excited that corn farmers in Illinois are partners in the new CornBelts baseball team located in Normal, IL. I invite all of you to visit the ballpark, see a great baseball game and learn some fun facts about farmers and corn. Also in 2011, NASCAR will use E-15 in all their race cars. E-15 is a fuel that is made from corn-based ethanol. NASCAR is "going green" by using a renewable fuel. That's exciting!

#### *Where do you see the corn industry headed in the future?*

Corn farmers work to grow more with less and will continue to do so. Each year, we are using less fertilizer and fewer pesticides to grow more bushels of corn on an acre of land. Technology, such as GPS (global positioning systems), help us do this. We are also working hard to protect our environment. Soil, water and clean air are very important to farmers. You will find more farmers using social media, such as Facebook and email, to visit with you about farming.



# Most Valuable Players

## Munir Cheryan

### Researcher

University of Illinois at Urbana-Champaign  
Urbana, IL

#### *Describe your job.*

My main goal is to find new uses for agricultural raw materials and crops and to develop better ways to manufacture food and “bio-based” products. Agricultural crops are traditionally used for making food products and animal feed, but they are also now being used for fuels and chemicals that were being produced from petroleum and other fossil sources. This has several benefits: we reduce our dependence on imported oil, we develop a more sustainable economy based on renewable resources, we lower our carbon “footprint” and it helps the rural economy.

#### *How has the research done at the University of Illinois improved the use of corn?*

The most obvious example is the production of ethanol from corn. Compared to ten years ago, ethanol output in the United States has increased from about 1.5 billion gallons to more than 10 billion gallons per year. Ethanol technology is more efficient today and we use less energy and water.

The increasing use of ethanol these days has also resulted in a large amount of by-products like carbon dioxide and DDGS (distillers dried grains with solubles). DDGS contains those portions of corn not used to directly produce ethanol, such as oil, protein and fiber. DDGS is used as animal feed which is important in our economy but of relatively low value. University of Illinois scientists have worked on different methods of processing corn to result in higher-value individual “clean” co-products like fiber, corn oil and protein ingredients that could have more value if sold separately. These research projects have resulted in several patents which are presently being commercialized. If successful, they will expand the uses of corn and improve the economics of the corn ethanol industry.



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