

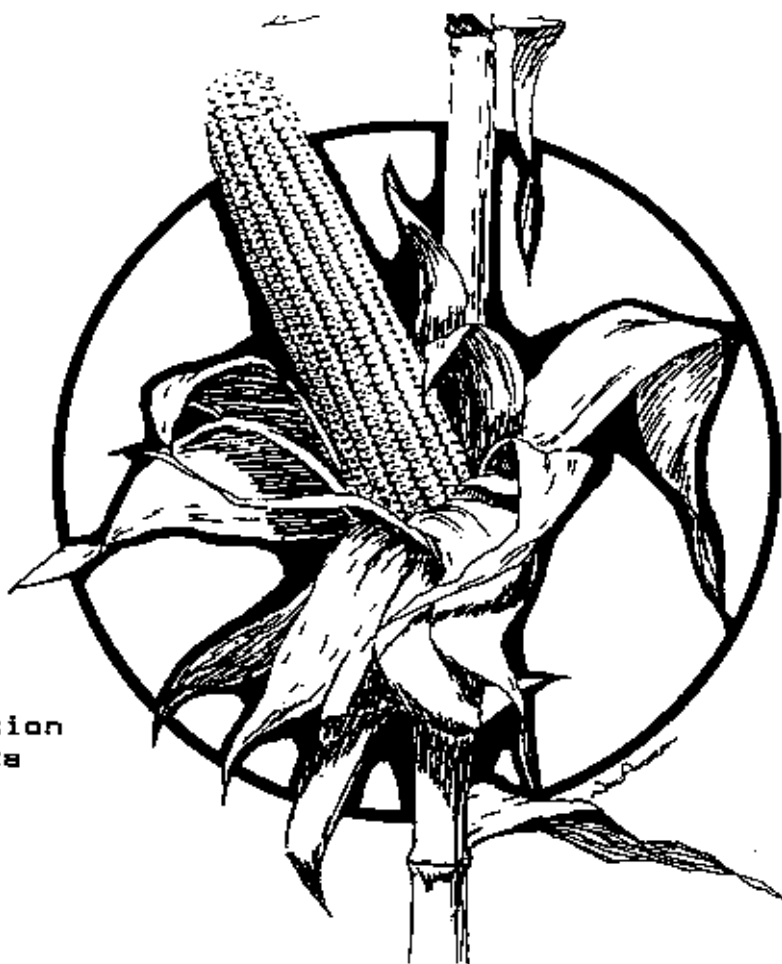
CORN

# Corn

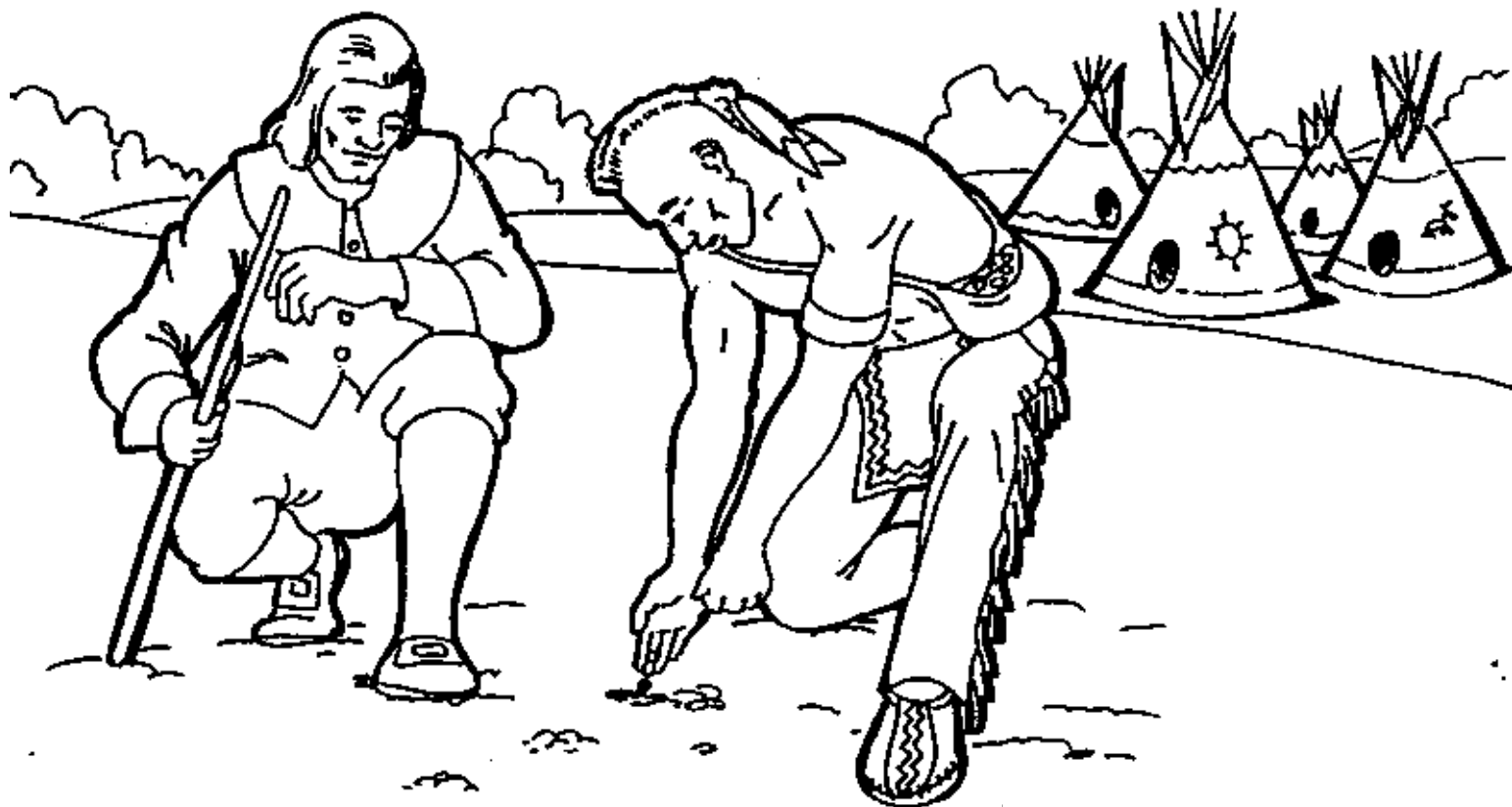
(maize)

America could not have developed or survived without it.

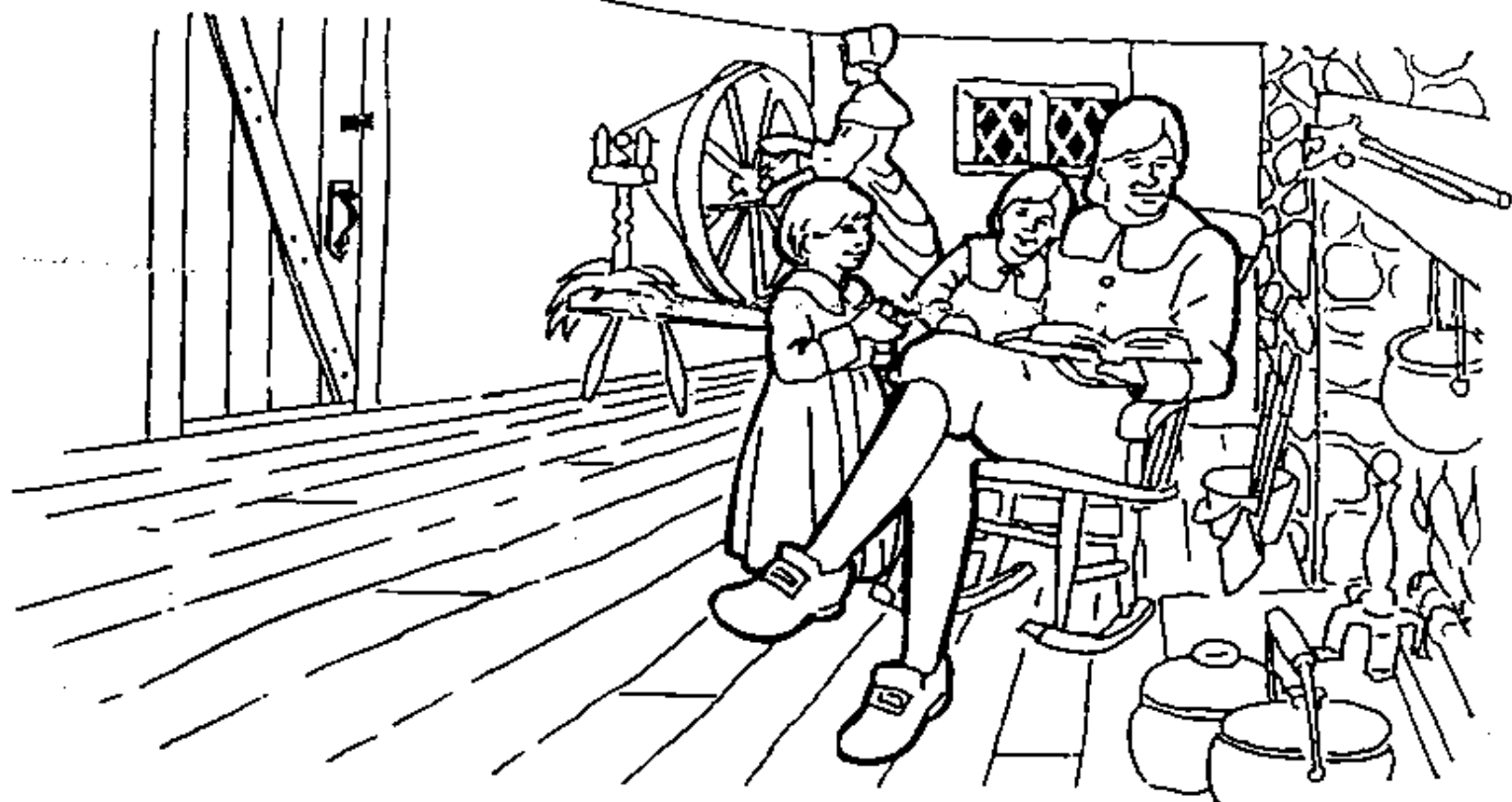
"Corn" coloring book courtesy of NEBRASKA CORN DEVELOPMENT, Utilization & Marketing Board, Lincoln, Nebraska



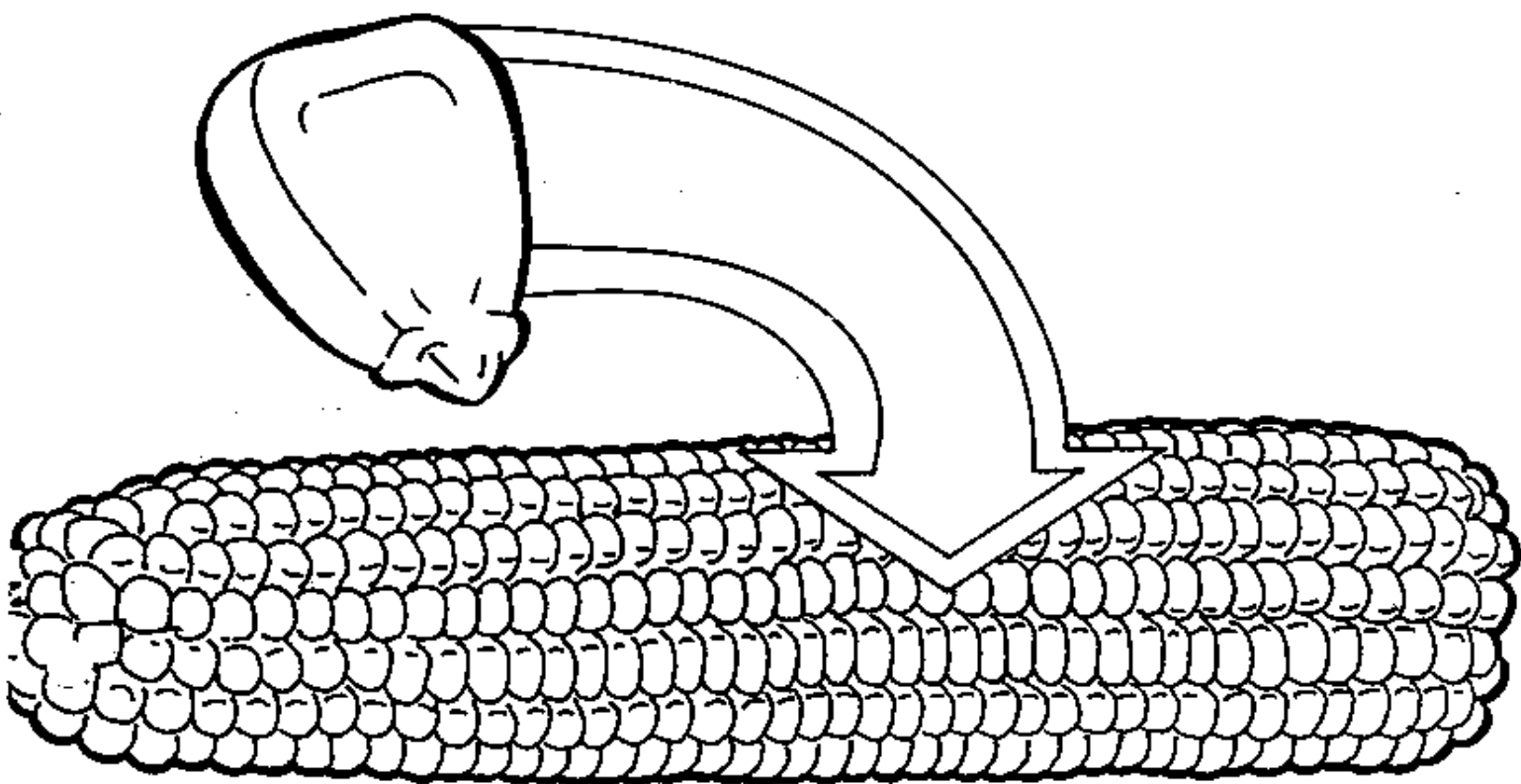
If friendly Indians had not taught the early settlers at Jamestown and Plymouth how to grow maize, both settlements would have disappeared and our nation's history might have been very different.



But corn (maize) did more than save those first settlers: it settled the continent. More than anything else, corn enabled the homesteaders to follow the trappers and explorers across the wilderness—with no more equipment than a sharp stick, a man could grow enough corn for his family and his oxen too!



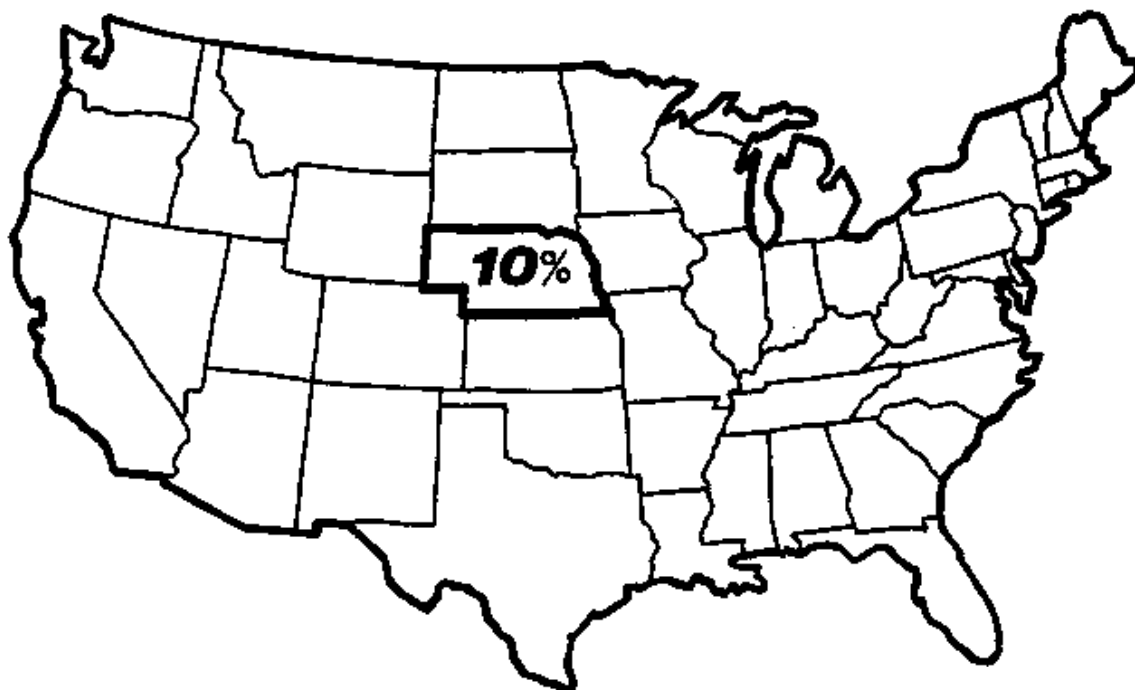
One kernel could multiply itself 500 times in just 100 days.

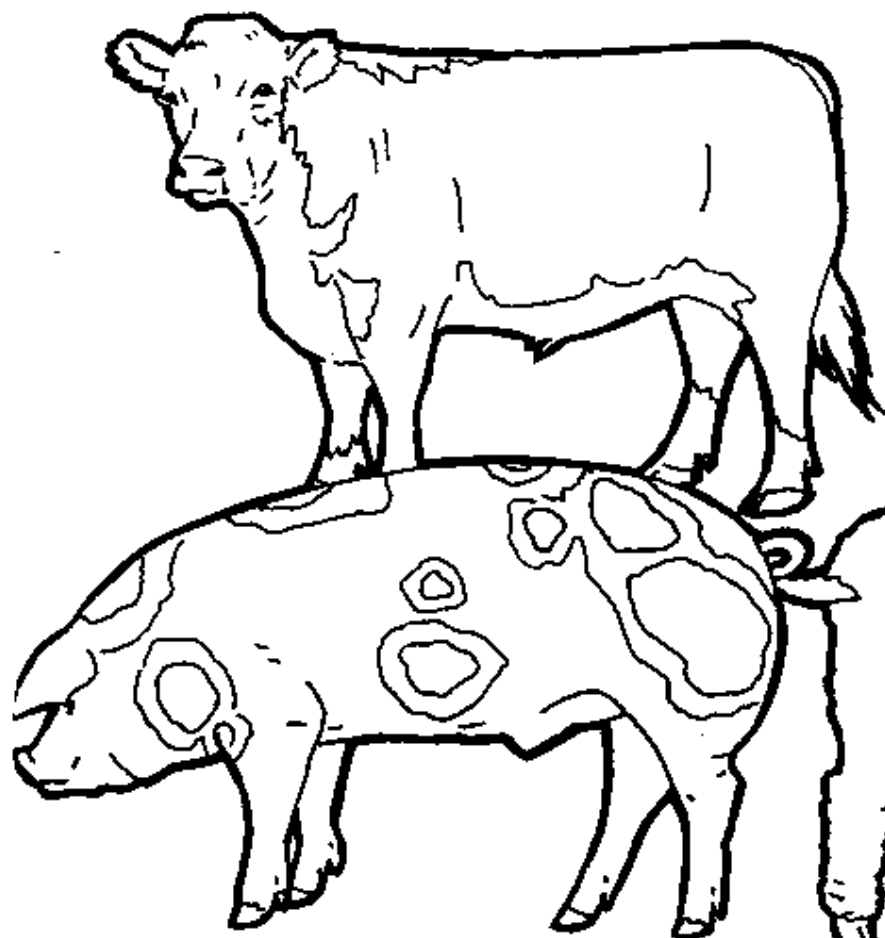


Things in America haven't changed all that much in the past two or three centuries. Corn is still our most important cereal crop. U.S. farmers grow corn on one out of every four acres of U.S. cropland.

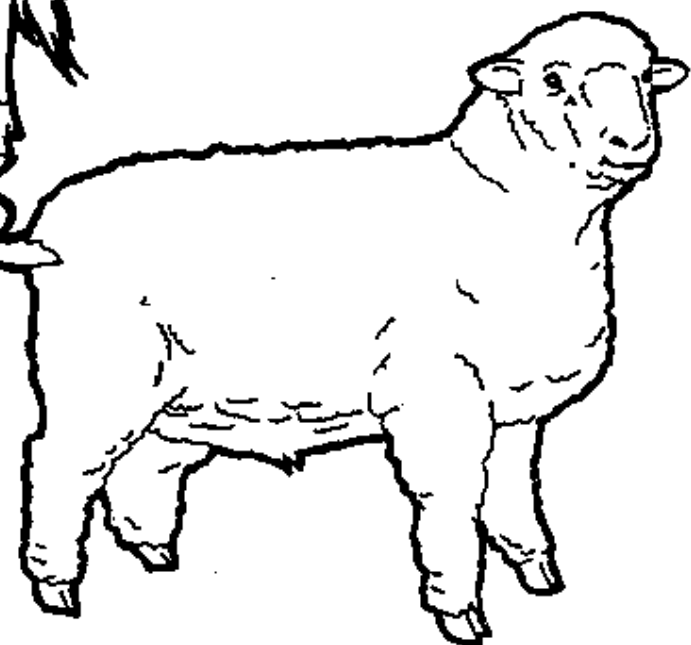


The United States produces about seven billion bushels of corn every fall. That's 47 percent of all the corn produced in the entire world. Nebraska accounts for over 10 percent of the United States's corn supply.

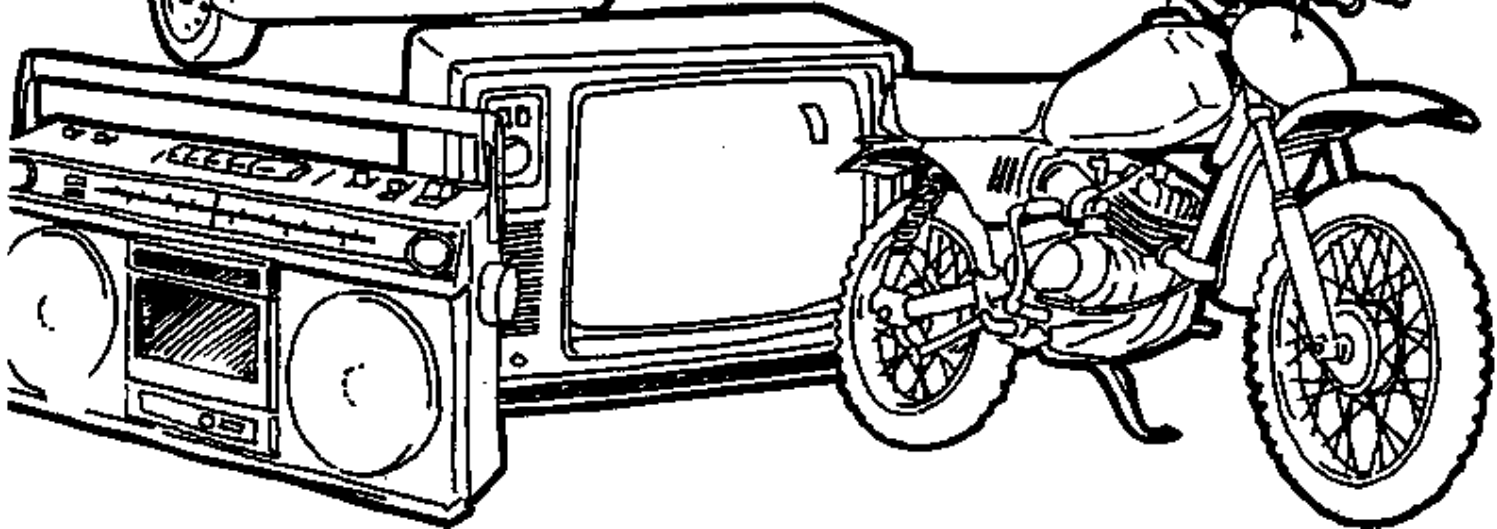
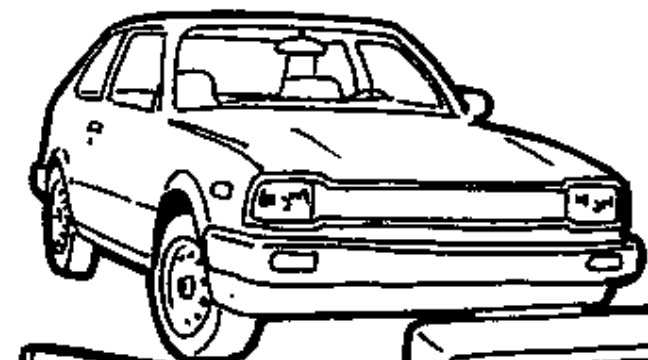




Livestock is still the largest user of corn. A distant second are our corn exports to foreign countries. And coming on fast in third place is the corn refining industry.



Corn sold overseas to foreign countries helps the United States in its balance of trade. America needs to export so we can afford to import luxury items like televisions, stereos and radios, automobiles and motorcycles, to name just a few items.



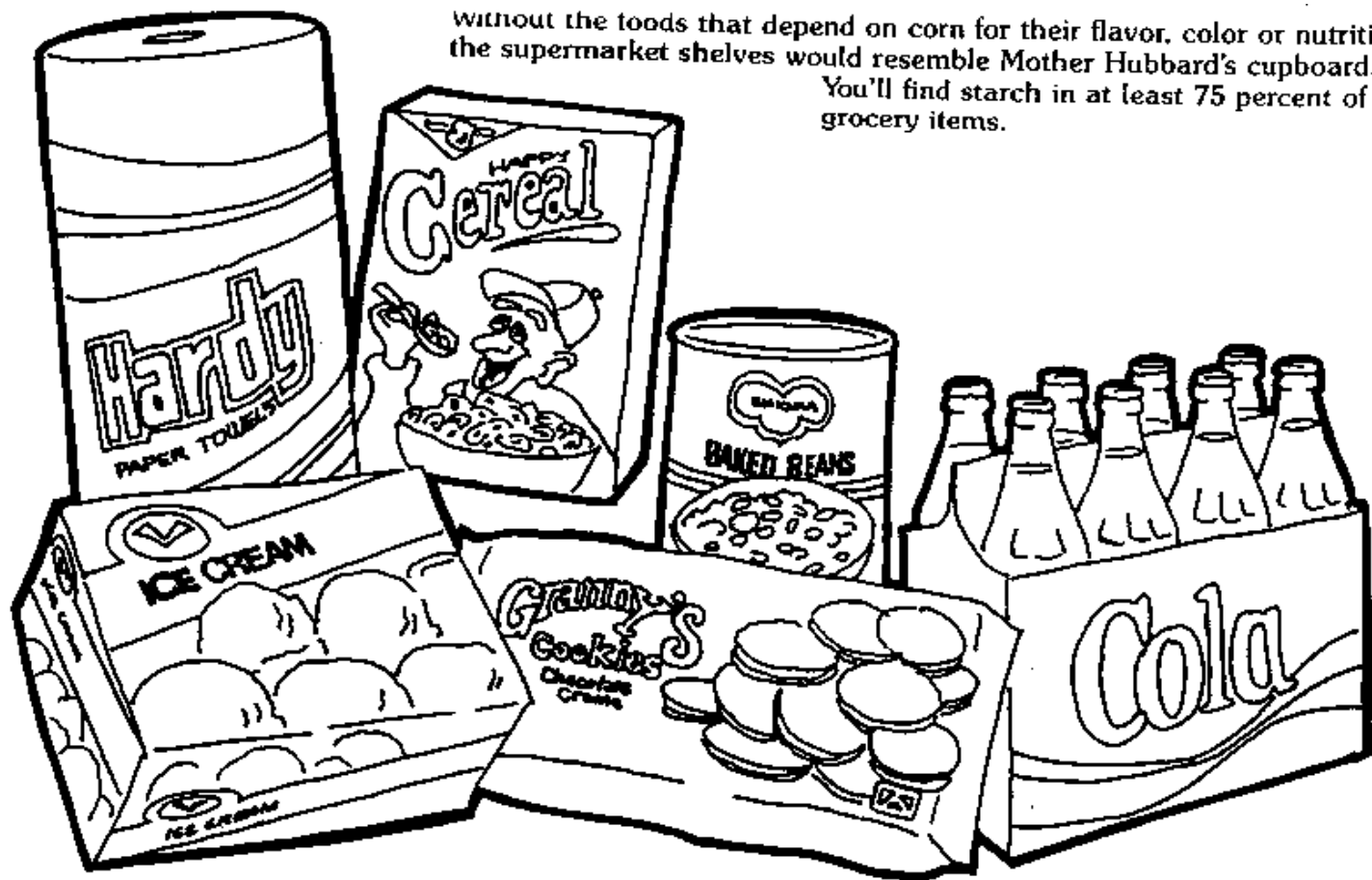
Daily, the average American consumes food made from three pounds of corn.



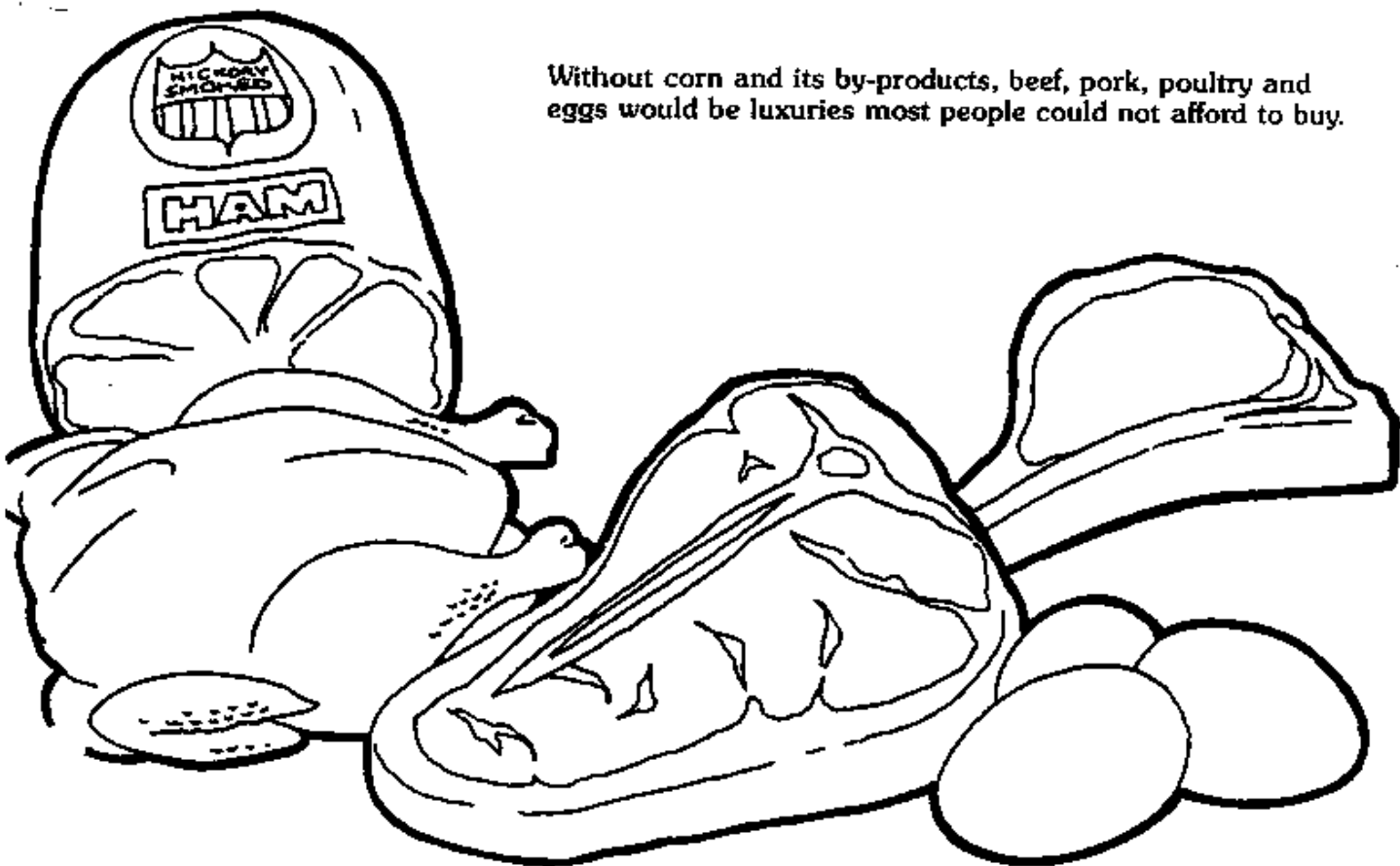
The average corn kernel is 61 percent starch. The balance is fiber, gluten, oil and water. Consumed in the form of a whole corn cereal, a single bushel of corn provides 23 people with enough food, energy and protein to meet the entire day's nutritional requirements.



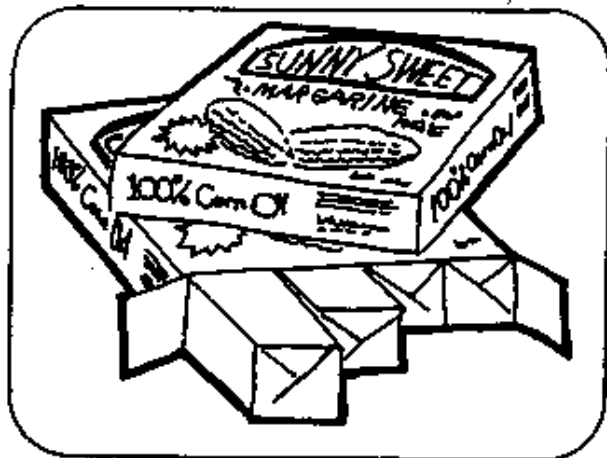
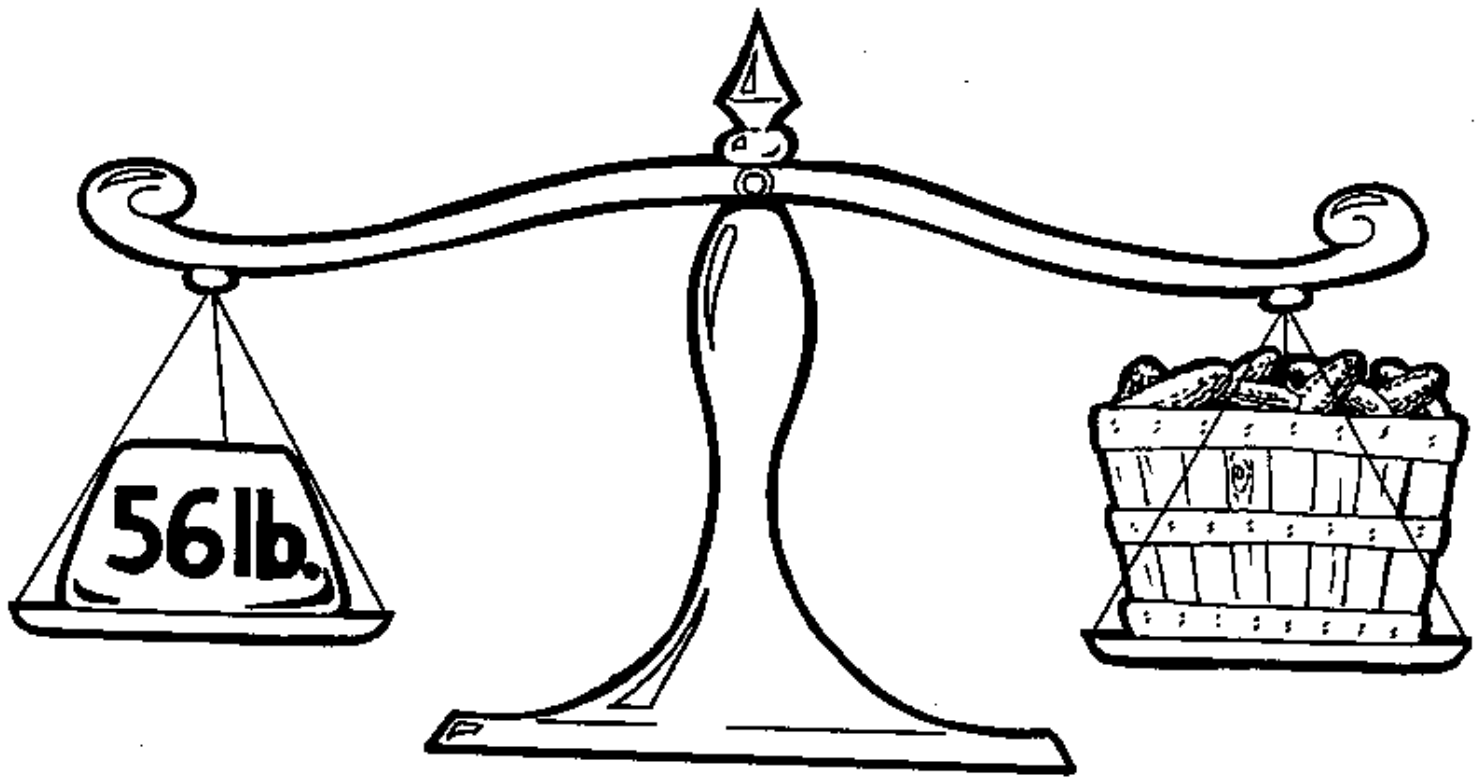
without the foods that depend on corn for their flavor, color or nutrition, the supermarket shelves would resemble Mother Hubbard's cupboard. You'll find starch in at least 75 percent of all grocery items.



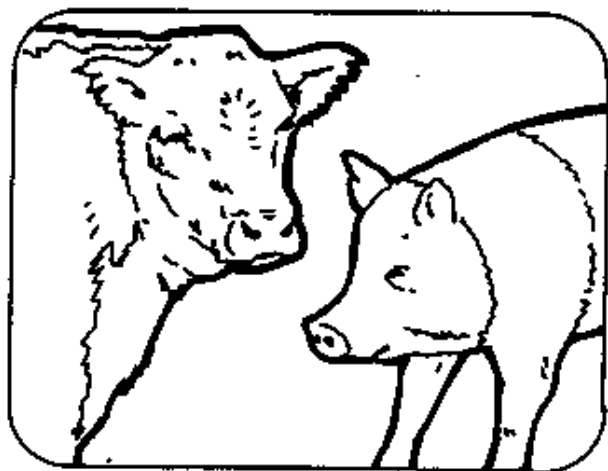
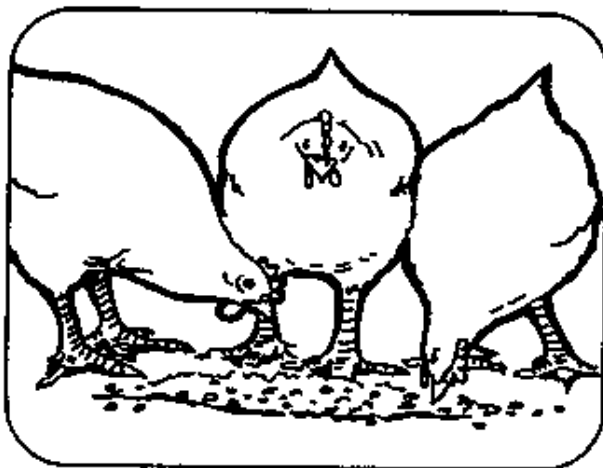
Without corn and its by-products, beef, pork, poultry and eggs would be luxuries most people could not afford to buy.



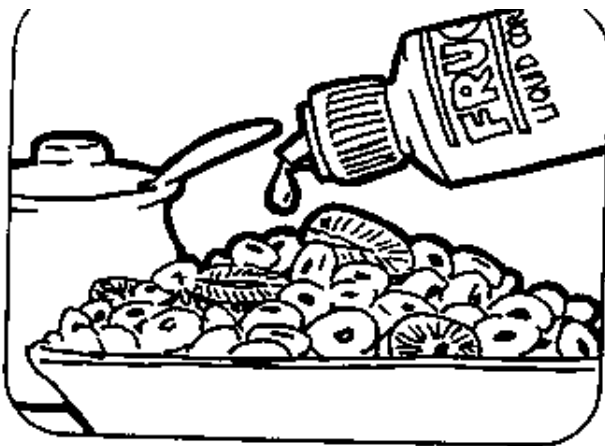
The corn refining industry makes products from corn through the wet-milling process. Corn refiners can take a bushel (56 pounds) of corn and make...



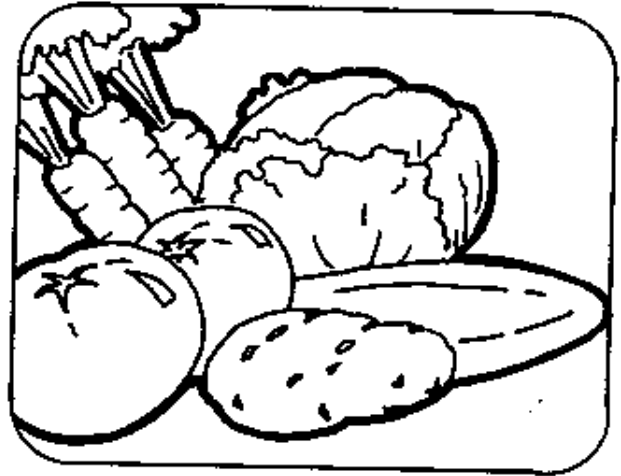
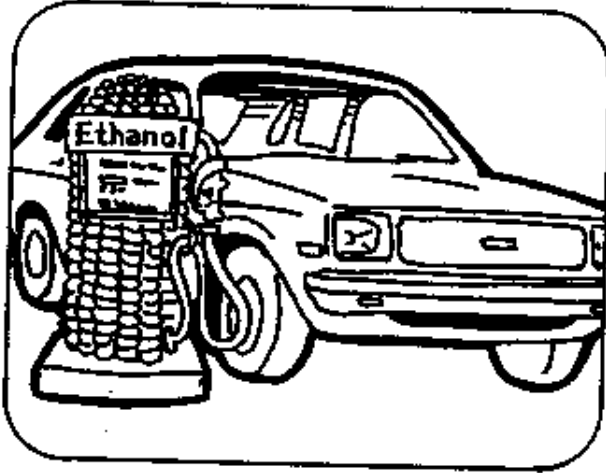
... Two pounds of corn oil margarine; three pounds of corn gluten meal which is a 60 percent protein fed to poultry; 14.5 pounds of corn gluten feed, a 21 percent protein feed to livestock...



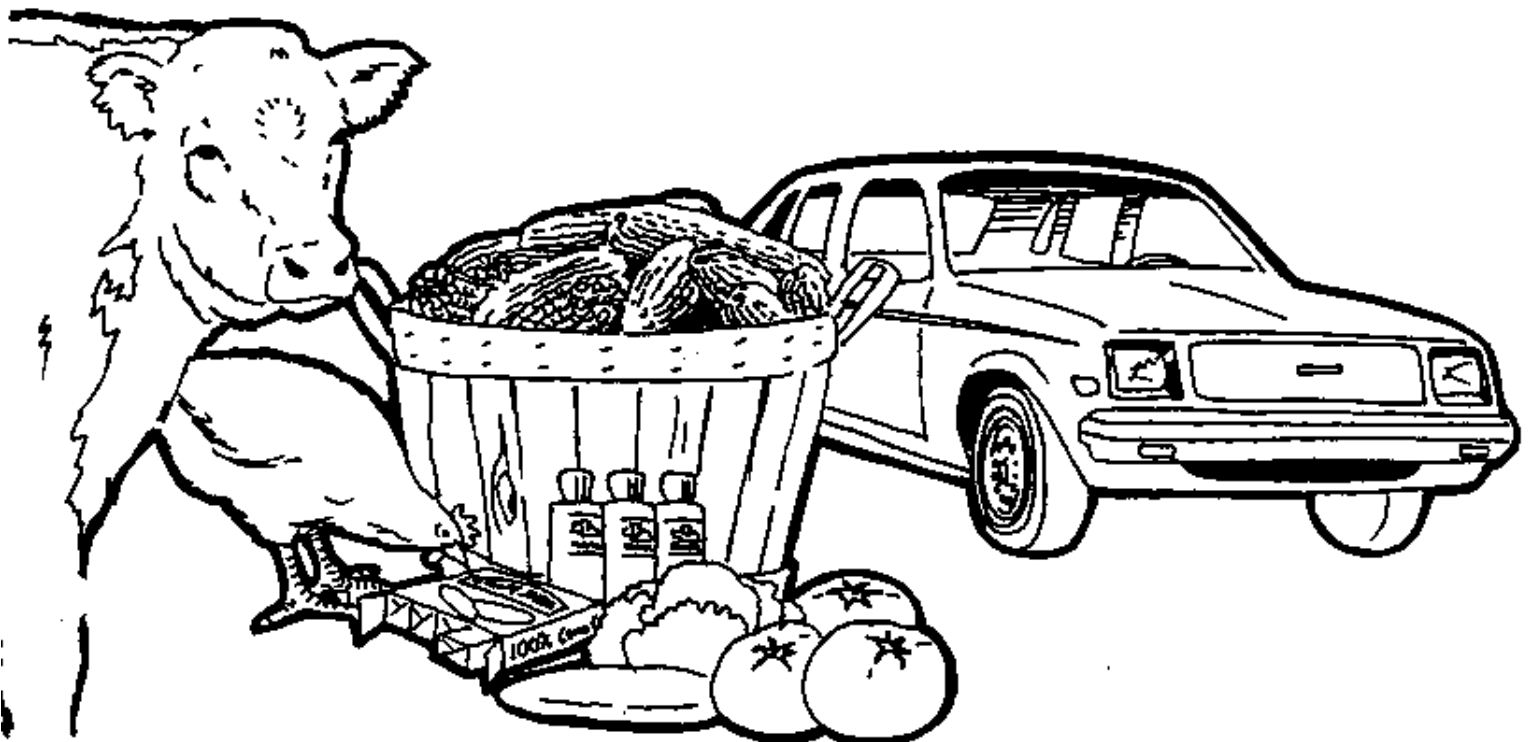




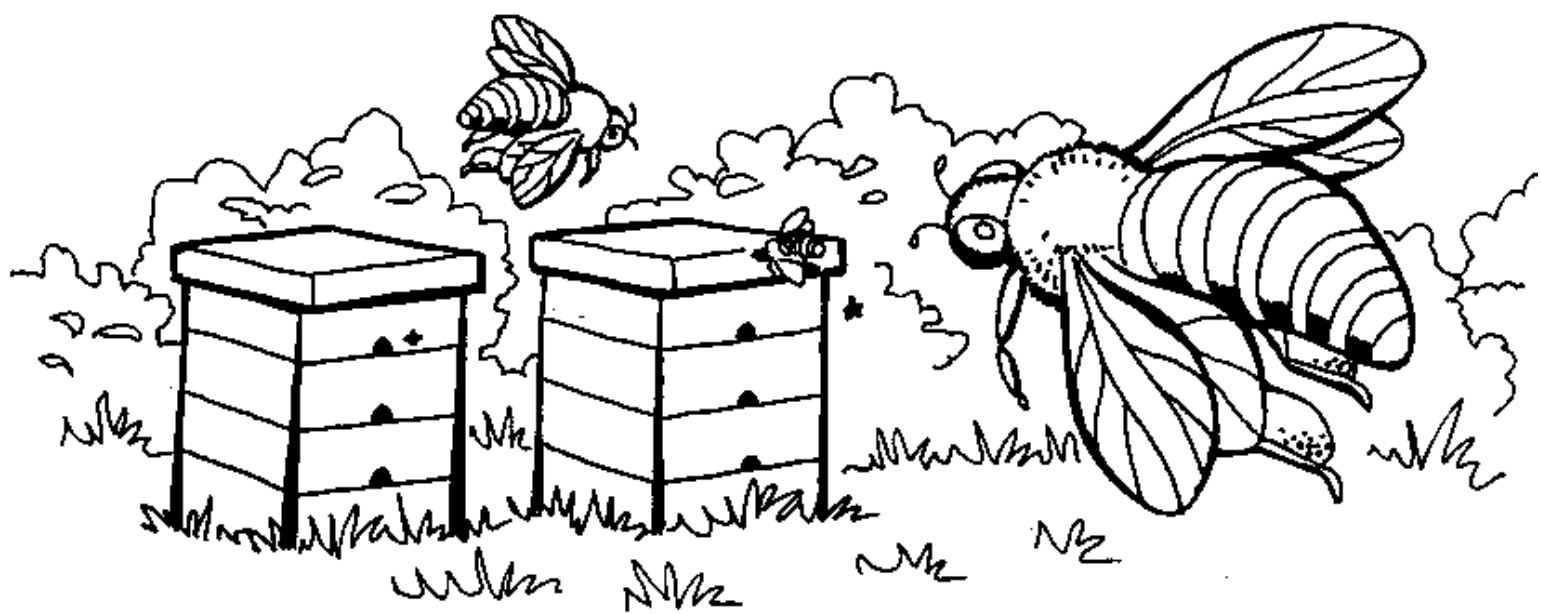
and make either 33 pounds of fructose, a corn sweetener  $1\frac{1}{2}$  times sweeter than ordinary table sugar; or  $2\frac{1}{2}$  gallons of power alcohol for more commonly called Super Unleaded gasoline; and from what's left, 17 pounds of carbon dioxide which...can be used to accelerate the hydroponic growth of fresh vegetables.



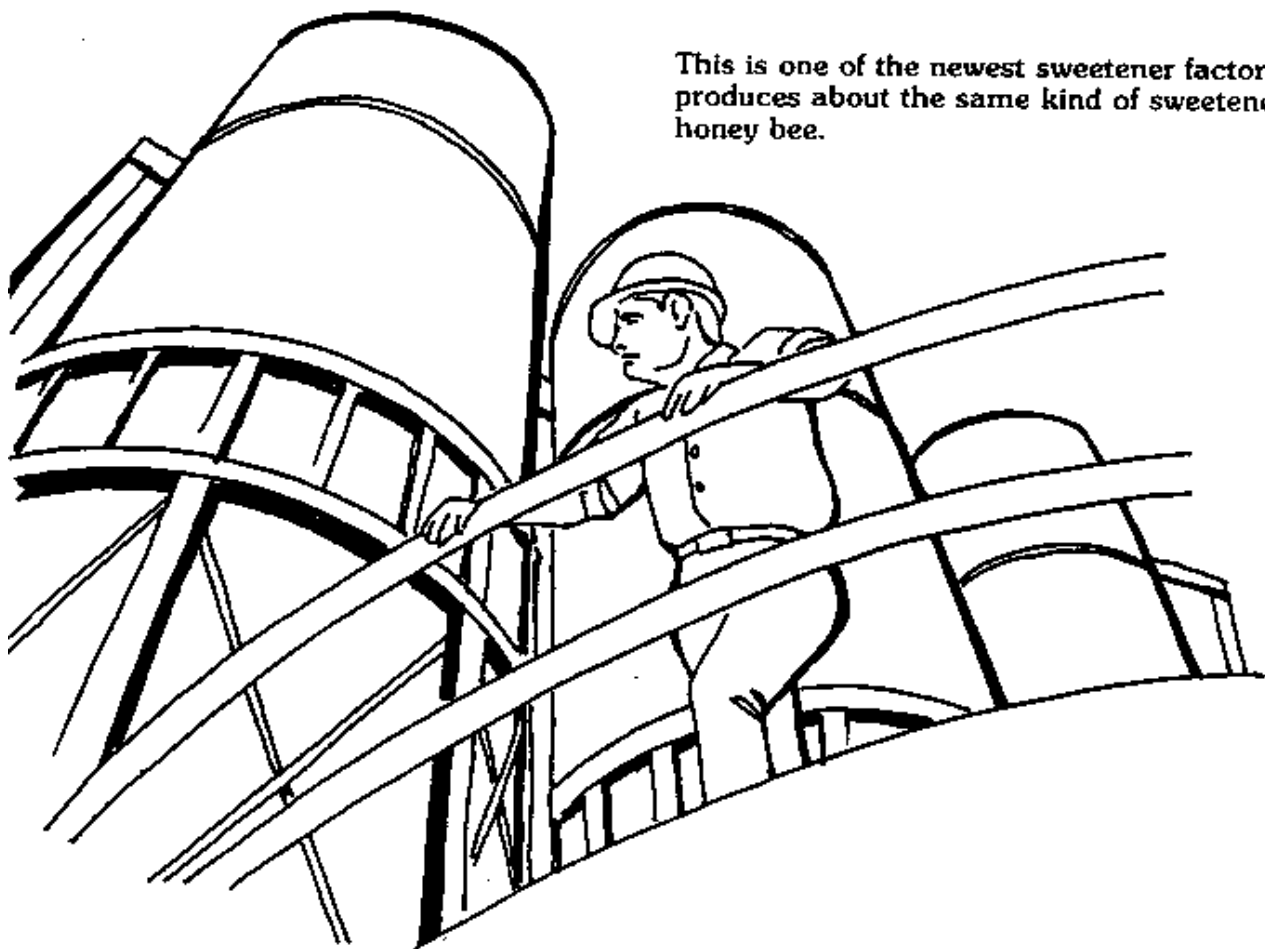
So you see...we get both food and fuel from each bushel of corn.



This is the world's oldest sweetener factory.

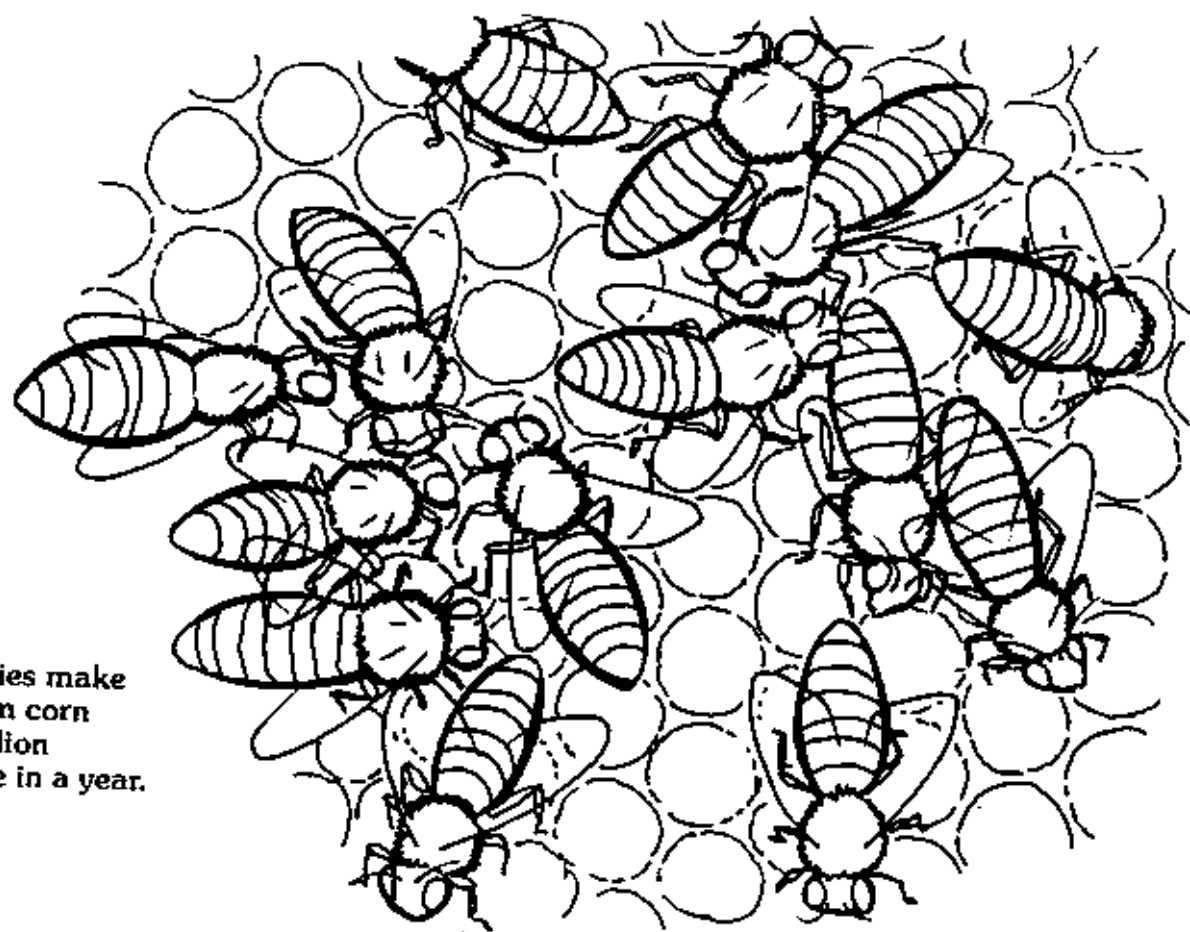


This is one of the newest sweetener factories, which produces about the same kind of sweeteners as the honey bee.



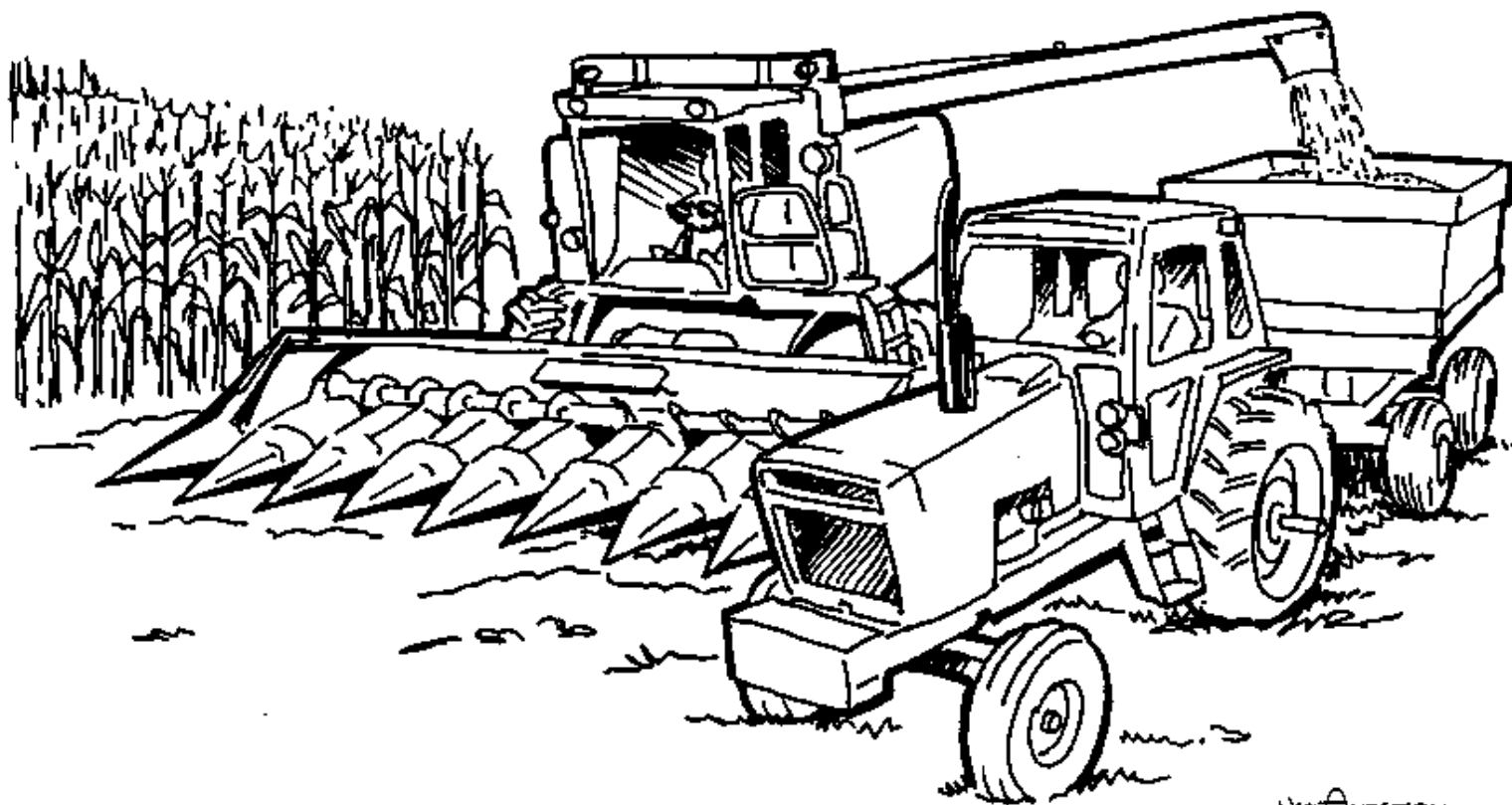


Fructose, a sweetener made from corn, is being used instead of ordinary sugar (sucrose) in many soft drinks, ice creams and canned and frozen products.

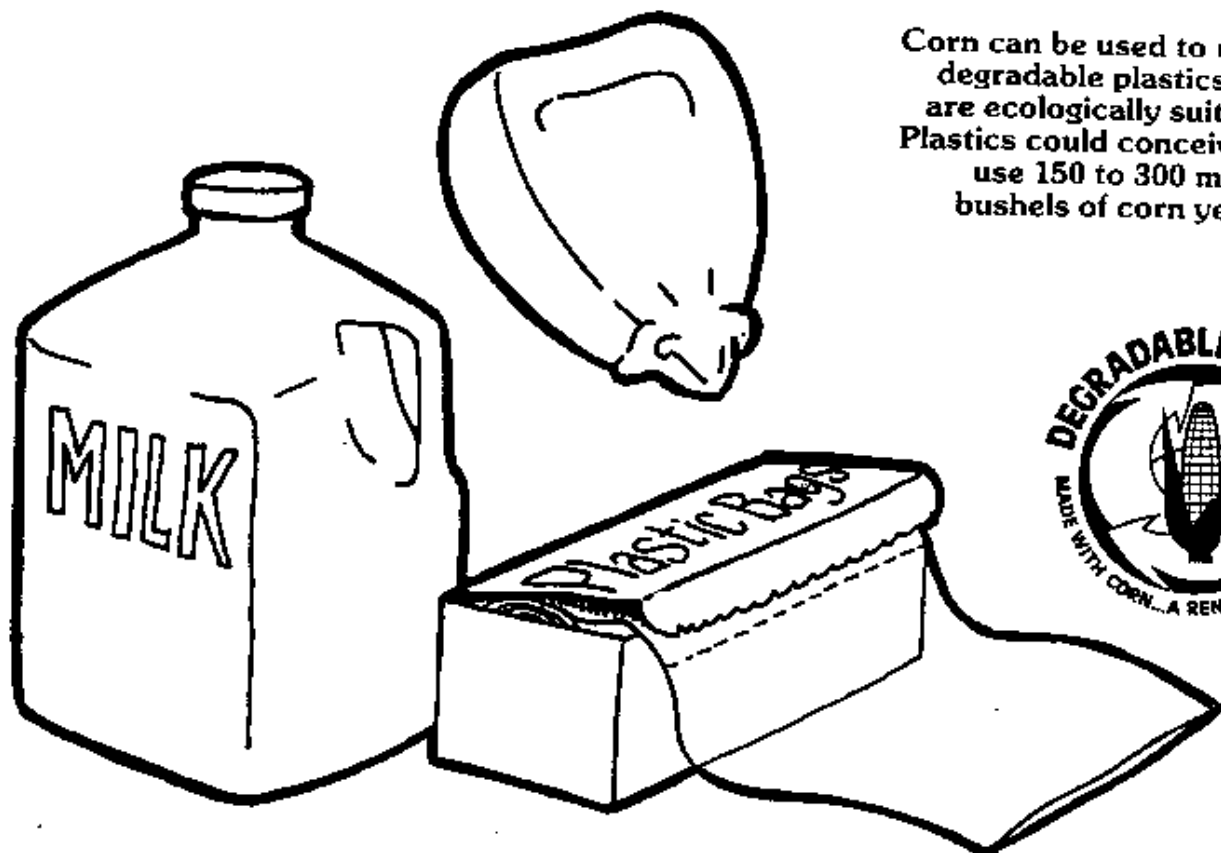


These modern factories make more sweeteners from corn every day than 18 billion honey bees can make in a year.

If wheat is the staff of life, corn is the cornerstone. Corn farmers are working to keep the American way of life a good life.



Neal Anderson



Corn can be used to make degradable plastics that are ecologically suitable. Plastics could conceivably use 150 to 300 million bushels of corn yearly.







*See something you like? There's corn in every one.*

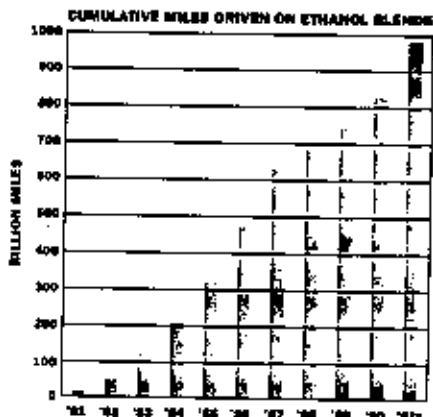
### **Eleven wonders of the world of corn**

#### **High fructose corn syrup**

Since 1980, HFCS has replaced sugar as the main ingredient in every major American soft drink. The production of HFCS alone provides the American farmer with a market for around 400 million bushels of corn each year.

#### **Ethanol**

What other product can reduce air pollution, clean your car's engine, and reduce our dependence on foreign oil? Since 1981, the world's drivers have logged almost one trillion miles on ethanol-blended fuels.



Based on an average of 15 MPG.  
\* Estimates

#### **Corn oil**

The oil that changed America's eating habits. It's a healthier, tastier choice that you'll find in margarine, pudding, bread, potato chips, fast-food french fries, and many other foods.

#### **Dextrose**

An ideal bulking agent in baking mixes and other products, dextrose is also the raw material for products that can be found in donuts, fruit drinks, and ready-to-eat meals.

#### **Other corn syrups**

Between HFCS and dextrose on the sweetness scale, these syrups are important in brewing, candy, canned fruits, ice cream, baked goods, and many other foods.

#### **Gluten feed and gluten meal**

From the gluten portion of the kernel come these important livestock feeds. Gluten feed helps boost milk production in dairy cattle, while gluten meal is used as a protein source and a pigmentation ingredient for poultry.

#### **Sorbitol**

A versatile hydrogenated dextrose, sorbitol is used as a humectant in toothpaste and cosmetics, a bulking agent in foods, and a stabilizer and sweetening agent in pharmaceuticals.

#### **Biochemicals**

The products of dextrose, soy flour, and fermentation technology, biochemicals include amino acids such as lysine, antibiotics such as bacitracin, vitamins such as biotin, and food additives such as citric and lactic acid.

#### **Starch**

The largest industrial users of starch are the paper and textile industries, and while only 20% of American starch goes to the food industry, its uses there could fill a supermarket.

#### **Dry-milled products**

While a great many corn products come from the wet milling process, dry millers produce a number of others, including corn grits, corn bran, and corn flour.

#### **Masa flour**

Some of today's corn is used in the thousand-year-old process of making masa, a ground corn flour used in Mexican specialty foods. Masa flour is an excellent example of combining an ancient process with modern technology to create a market breakthrough.



## Illinois Corn Marketing Board

# ETHANOL WORK

### SEVEN REASONS TO MAKE ETHANOL BLENDED FUELS A "RENEWABLE FUEL OF CHOICE"

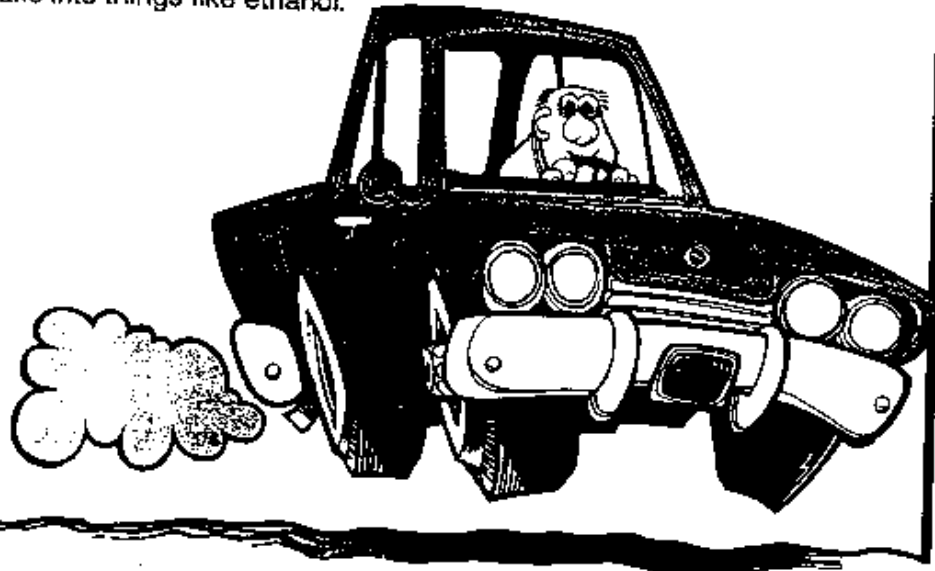
- 1- CLEAN AIR** - More than 40% of U.S. air pollution results from automobile emissions. Cars, trucks, buses, & other vehicles burn half of the 17 million barrels of oil our nation consumes daily. Ethanol blended fuels provide the most significant carbon monoxide reduction of any liquid fuel commercially available.
- 2- HEALTHIER PEOPLE** - Most reasonable estimates of total health care cost from exposure to air pollution in the U.S. lie in the tens of billions of dollars annually. Lung Association analysis estimate the reduction in health care costs would more than offset the cost of a 50 to 80% cut in auto emissions by the year 2003.
- 3- IMPROVED NATIONAL ECONOMY** - Oil imports accounted for between 20 and 40% of our 161 billion dollar average annual trade deficit during the past decade. If one takes into account the 40 to 50 billion dollar annual military expenditures to insure the flow of Persian Gulf oil, the billions of dollars for oil related strategic reasons, plus interest payments to borrow these funds, the "TRUE COST" of Mid East oil would exceed 50 dollars per barrel before "Desert Shield". Adding 10% ethanol to our nation's gasoline supply would cut petroleum imports by 750,000 barrels per day - more than enough to offset petroleum imports from Iraq.
- 4- BETTER ENGINE PERFORMANCE** - A 10% blend of ethanol with gasoline raises its octane rating 3 points & results in cleaner burning. No studies support negative claims against ethanol but volumes of studies and fuel evaluations document its benefits. Billions of auto miles, thousands of tractor hours, and a transatlantic airplane flight on pure ethanol support the reliability and superior performance of ethanol.
- 5- RENEWABLE SOURCE** - As the world's supply of liquid fuels dwindles, costs increase. Ethanol is produced from renewable crops such as corn, beets, sorghum, sugar cane, potatoes, etc.
- 6- OXYGENATES SUPERIOR TO AROMATICS** - EPA's 1983 mandated elimination of lead from gasoline accelerated use of sub-octane gasoline for blending with octane enhancing additives. This created awareness of the importance of oxygenated fuels to reduce carbon monoxide pollution. Some oil companies choose to use aromatics containing benzene, xylene, and toluene to increase the octane of their fuels. Benzene is a known carcinogen while toluene and xylene are toxic.
- 7- ENHANCED FOOD AND FEED** - It is a myth that producing fuel from grain detracts from the food supply in the U.S. All protein and nutrient minerals are still available. Moreover, the protein quality is enhanced by the yeast and enzymes of the fermentation process used to produce ethanol. Approximately 32 of 56 lbs. in a bushel of corn is starch which is in abundance in the world food supply system. If corn costs \$2.50 per bushel to produce 2.5 gallons of ethanol, the feedstock cost of ethanol would be \$100 per gallon. Remember all the minerals & digestible grain solubles (DGS) remain for feed and food plus carbon dioxide to be used in drinks, fire extinguishers and hydroponic culture of vegetables. Ethanol and value added products made from agricultural crops make renewable fuels practical, economical, and advantageous.

# DON'T BE CONFUSED

Corn is one farm product that has many new uses.

The gasoline your parents put in your family car may contain **ethanol**. When ethanol is blended with gasoline, engine exhaust is cleaner so our air is protected. And the best thing about ethanol is we don't use as much scarce petroleum resource to make our fuel.

Ethanol is made from a renewable resource — corn. Renewable means that farmers can produce more corn every season to make into things like ethanol.



Another new use for corn is in making **biodegradable plastic**.

We use plastic to make many things like grocery bags, dinner plates, and food containers. Most plastics are made from crude oil (petroleum). These plastics last in our environment for thousands of years because they do not break down or biodegrade. They also take up valuable space in our landfills. Many experts feel landfills in the United States will be full within the next 20 years.

*Corn plastics will break down.* They are made from corn starch and will not harm the environment.

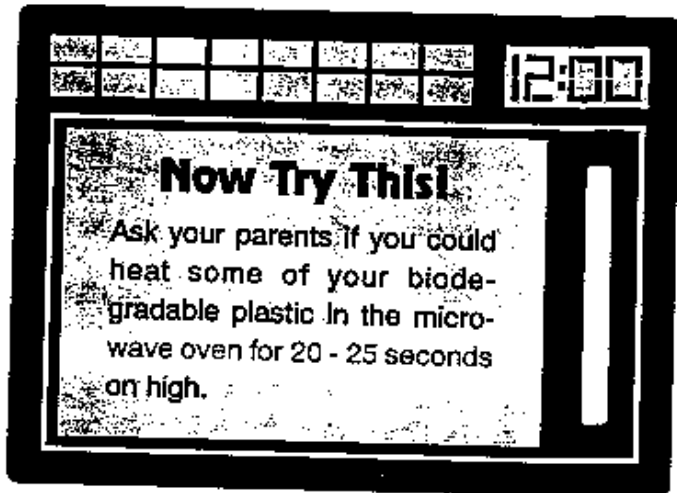
**Name 3 things that could be made from corn plastic in the future.**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

## MAKE YOUR OWN BIODEGRADABLE PLASTIC STUFF

Place a check mark in front of each step as you finish it.

- \_\_\_\_\_ 1. Place a tablespoon of cornstarch in a paper cup.
  - \_\_\_\_\_ 2. Add two drops of corn oil to the cornstarch.
  - \_\_\_\_\_ 3. Add a tablespoon of water to the oil and cornstarch.
  - \_\_\_\_\_ 4. Stir the mixture.
  - \_\_\_\_\_ 5. Add two drops of your favorite food coloring to the mixture and stir well.
1. What do you notice about your biodegradable plastic?  
\_\_\_\_\_
  2. Is your biodegradable plastic the same as the other students?  
\_\_\_\_\_
  3. What could you make with this biodegradable plastic if you let it harden? Remember it will dissolve eventually.  
\_\_\_\_\_



- What happens to your plastic? \_\_\_\_\_
- \_\_\_\_\_
- Form your plastic into a ball and describe what it will do.
- \_\_\_\_\_
- \_\_\_\_\_

Experiment adapted from "Agriculture: Renew Our Planet-Growing Energy for the Future" K-6 Agricultural Concepts Curriculum, Illinois Facilitating Coordinator for Agriculture Education Program funded by Illinois State Board of Education.





**Wheat**

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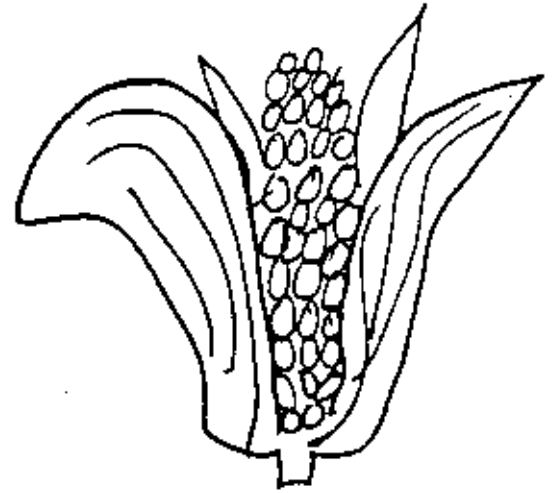
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- flour
- cereal
- syrup
- popcorn
- spaghetti
- dog food
- cooking oil
- soap
- fabric
- nylon stockings
- bread
- chips



**Corn**

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**Match each grain with its products.  
Words may be used more than one time.**