

# Appendix 1: The Jungle

**Written by:** Upton Sinclair

The *Jungle* is a 1906 novel written by the American journalist and novelist Upton Sinclair (1878–1968). Sinclair wrote the novel to portray the lives of immigrants in the United States in Chicago and similar industrialized cities. Many readers were most concerned with his exposure of health violations and unsanitary practices in the American meatpacking industry during the early 20th century, based on an investigation he did for a socialist newspaper.

The book depicts working class poverty, the absence of social programs, harsh and unpleasant living and working conditions, and a hopelessness among many workers. These elements are contrasted with the deeply rooted corruption of people in power. A review by the writer Jack London called it, "the Uncle Tom's Cabin of wage slavery."

Sinclair was considered a muckraker, or journalist who exposed corruption in government and business. He first published the novel in serial form in 1905 in the socialist newspaper, *Appeal to Reason*, between February 25, 1905, and November 4, 1905. In 1904, Sinclair had spent seven weeks gathering information while working incognito in the meatpacking plants of the Chicago stockyards for the newspaper. It was published as a book on February 26, 1906 by Doubleday and in a subscribers' edition.

A film version of the novel was made in 1914, but it has since become lost.

## Plot summary

The main character in the book is Jurgis Rudkus, a Lithuanian immigrant trying to make ends meet in Chicago. The book begins with his and Ona's wedding feast. He and his family live near the stockyards and meatpacking district, where many immigrants work who don't know much English. He takes a job at Brown's slaughterhouse. Rudkus had thought the US would offer more freedom, but he finds working conditions harsh. He and his young wife struggle to survive. They fall deeply into debt and are prey to con men. Hoping to buy a house, they exhaust their savings on the down-payment for a sub-standard slum house, which they cannot afford. The family is evicted after their money is taken.

Rudkus had expected to support his wife and other relatives, but eventually all – the women, children, and his sick father – seek work to survive. As the novel progresses, the jobs and means the family uses to stay alive slowly lead to their physical and moral decay. Accidents at work and other events lead the family closer to catastrophe. One injury results in Rudkus being fired; he later takes a job at Durham's fertilizer plant. The family's hardships accumulate as Ona confesses that her boss, Connor, had raped her, and made her job dependent on her giving him sexual favors. In revenge, Rudkus attacks Connor, resulting in his arrest and imprisonment.

After being released from jail, Rudkus finds that his family has been evicted from their house. He finds them staying with relatives, where Ona is in labor with her second child. She dies in childbirth at age eighteen from blood loss. Rudkus had lacked the money for a doctor. Soon after, his first child drowns in a muddy street. Rudkus leaves the city and takes up drinking. His brief sojourn as a hobo in rural United States shows him that there is really no escape – farmers turn their workers away when the harvest is finished.

Rudkus returns to Chicago and holds down a succession of laboring jobs and as a con-man. He drifts without direction. One night, he wanders into a lecture being given by a Socialist orator, where he finds community and purpose. Employed by a fellow socialist, he resumes his support of his wife's

family, although some of them are damaged beyond repair. The book ends with another socialist rally, which follows some political victories.

### **Reception**

Upton Sinclair intended to expose "the inferno of exploitation [of the typical American factory worker at the turn of the 20th Century]," but the reading public fixed on food safety as the novel's most pressing issue. Sinclair admitted his celebrity arose "not because the public cared anything about the workers, but simply because the public did not want to eat tubercular beef". Some critics have attributed this response to the characters, most of whom, including Rudkus, have unpleasant qualities. The last section, concerning a socialist rally Rudkus attended, was later disavowed by Sinclair. But his description of the meatpacking contamination captured readers' attention.

Sinclair's account of workers falling into rendering tanks and being ground along with animal parts into "Durham's Pure Leaf Lard" gripped the public. The poor working conditions, and exploitation of children and women along with men, were taken to expose the corruption in meat packing factories.

The British politician Winston Churchill praised the book in a review.

### **Federal response**

President Theodore Roosevelt had described Sinclair as a "crackpot" because of the writer's socialist positions. He wrote privately to William Allen White, "I have an utter contempt for him. He is hysterical, unbalanced, and untruthful. Three-fourths of the things he said were absolute falsehoods. For some of the remainder there was only a basis of truth." After reading *The Jungle*, Roosevelt agreed with some of Sinclair's conclusions. The president wrote "radical action must be taken to do away with the efforts of arrogant and selfish greed on the part of the capitalist." He assigned the Labor Commissioner Charles P. Neill and social worker James Bronson Reynolds to go to Chicago to investigate some meat packing facilities.

Learning about the visit, owners had their workers thoroughly clean the factories prior to the inspection, but Neill and Reynolds were still revolted by the conditions. Their oral report to Roosevelt supported much of what Sinclair portrayed in the novel, excepting the claim of workers falling into rendering vats. Neill testified before Congress that the men had reported only "such things as showed the necessity for legislation." That year, the Bureau of Animal Industry issued a report rejecting Sinclair's most severe allegations, characterizing them as "intentionally misleading and false," "willful and deliberate misrepresentations of fact," and "utter absurdity."

Roosevelt did not release the Neill-Reynolds Report for publication. His administration submitted it directly to Congress on June 4, 1906.

Public pressure led to the passage of the Meat Inspection Act and the Pure Food and Drug Act of 1906; the latter established the Bureau of Chemistry (in 1930 renamed as the Food and Drug Administration).

Sinclair rejected the legislation, which he considered an unjustified boon to large meat packers. The government (and taxpayers) would bear the costs of inspection, estimated at \$30,000,000 annually. He complained about the public's misunderstanding of the point of his book in *Cosmopolitan Magazine* in October 1906 by saying, "I aimed at the public's heart, and by accident I hit it in the stomach."

Source: [http://en.wikipedia.org/wiki/The\\_Jungle](http://en.wikipedia.org/wiki/The_Jungle)

## Appendix 2: A Short History of Margarine

Canadians weren't the only ones indignant about the tax on margarine. In this photo, Lisa Kirk (left), a Broadway star, and Millicent Coleman named "Miss Margarine" add their names to a petition to Congress urging removal of restrictions on the sale of margarine in April 1948.

Butter substitutes have a rich history, but lest we spread ourselves too thin, we'll concentrate on the particularly curious period between the 1880s and 1950s, when margarine was outlawed in Canada and margarine-hungry Canadians bootlegged the stuff.

Newfoundland manufactured margarine because it made good sense. Its climate was too cold to reliably source cream from cows, and margarine could be made with a combination of vegetable, mineral and animal oils (most notably seal oil). This made margarine remarkably cheaper to produce than butter. Those cost savings trickled down to the consumer, making margarine available to every level of society.

Newfoundland's margarine manufacturers were committed to keeping their customers loyal, and that meant keeping them incentivized to eat it. In 1931, when nutritional study findings revealed that Newfoundlanders were deficient in vitamins A and D, margarine manufacturers added those ingredients to their product. (This isn't as evil as it sounds; additives make it into food products all the time. Look for labels that say, "fortified with" to get an idea of which foods in your pantry are pumped up with vitamins.)

Everyone could afford margarine. Everyone got a little more vitamins A and D when they ate it. Plus, the booming margarine business kept people in the workforce. What could go wrong?

At the time, Newfoundland was still a British colony. In 1949, it became part of Canada — where dairy farmers were fiercely protective of their trade. In fact, margarine had been outlawed in Canada since 1886. Canada's Parliament passed federal legislation in 1949 to prohibit the manufacture and sale of margarine anywhere in Canada, except Newfoundland and Labrador, where it had an industrial stronghold. But that didn't stop margarine-hungry Canadians from bringing it across the border. By 1950, the law was revised so that margarine manufacturing, importing and exporting would be regulated on the provincial level. Until 2008, Quebec regulated that margarine had to be sold colorless, so it wouldn't be confused with yellow butter.

Only in Canada, right? No. Americans were equally as mad about margarine. Just as your great-grandmother would turn up her nose at any number of shelf-stable foods in your pantry today, Americans in the late 1800s were incredibly suspicious of food substitutes. In Nina Teicholz's "The Big Fat Surprise," a book that examines the benefits of consuming animal fats over vegetable fats, she quotes Minnesota Gov. Lucius Frederick Hubbard, who in 1880 called margarine "'a mechanical mixture' created by 'the ingenuity of depraved human genius.'" Previous food substitutes — like Crisco, which replaced animal lard — were intended for cooking and couldn't be seen in the foods gracing dinner tables. Margarine, on the other hand, was intended to be eaten in its original form.

From 1917 to 1928, plenty of bills proposed outlawing margarine (largely at the request of the dairy industry), but the federal government was pretty hands off, with the exception of a 1931 law that mandated margarine could not be yellow. It was up to the states to decide how to treat margarine, and some taxed it so heavily that consumers would drive over state lines to buy it in bulk where it was cheaper. Not exactly bootlegging, but still!



By the 1950s, most states had voted to overturn margarine tax laws, and when the American Heart Association endorsed margarine in the 1960s as a good choice for those aiming to lower their saturated fat intake, the staple was here to stay.

That is, until we got wise to the health risks of ingesting saturated and trans fats. Margarine might be maligned, but it hasn't disappeared completely. Kristen Toth, a Raleigh, North Carolina-based MS, RD, LPN, attests, "I think once a food makes it into the mainstream U.S. food system, it's hard to eliminate it from the food supply. Stick margarine can be a cost-affordable option for some people, compared to butter."

## Appendix 3: Fun Food Facts

### Corn Poppin' Facts

[http://www.agday.org/education/fun\\_facts.php](http://www.agday.org/education/fun_facts.php) Popcorn pops because water is stored in a small circle of soft starch in each kernel. As the kernel is heated, the water heats, the droplet of moisture turns to steam, and the steam builds up pressure until the kernel finally explodes to many times its original volume.

- Americans today consume 17.3 billion quarts of popped popcorn each year! The average American eats about 68 quarts!
- While the first breakfast cereal was made by adding sugar and milk to popped popcorn, a shortage of baking flours after World War II forced bread-makers to substitute up to 25% of wheat flour with ground popped popcorn. Over the years, popcorn also has been used as an ingredient in pudding, candy, soup, salad and entrees.
- Popcorn's nutritional value comes from the fact that, like other cereal grains, its primary function is to provide the body with heat and energy.
- Microwave popcorn is the same as other popcorn except the kernels are usually larger and the packaging is designed for maximum "popability."

### Cherrific!

- The same chemicals that give tart cherries their color may relieve pain better than aspirin and ibuprofen in humans.
- Eating about 20 tart cherries a day could reduce inflammatory pain and headache pain.
- There are about 7,000 cherries on an average tart cherry tree (the number varies depending on the age of the tree, weather and growing conditions). It takes about 250 cherries to make a cherry pie, so each tree could produce enough cherries for 28 pies!
- Today, in Michigan, there are almost 4 million cherry trees which annually produce 150 to 200 pounds of tart cherries.

### Head Strong

- Lettuce is a member of the sunflower family.
- Darker Green lettuce leaves are more nutritious than lighter green leaves.
- Americans eat about 30 pounds of lettuce every year. That's about five times more than what we ate in the early 1900s.
- In the United States, lettuce is the second most popular fresh vegetable.
- Almost all lettuce is packed right in the field.
- About 25% of all iceberg lettuce is made into fresh cut salads.

### What's up Doc?

- The plant pigment that gives carrots and other vegetables their vivid orange color is Beta-Carotene. Fruits and Vegetables that are yellow/orange in color contain Beta-Carotene and carrots are one of the richest in this nutrient. Our bodies convert Beta-Carotene into Vitamin A.
- The bright orange color of carrots indicates they are an excellent source of Vitamin A which is important for good eyesight, especially at night. Vitamin A helps your body fight infection, and keeps your skin and hair healthy!

## **Berry, Berry Good for You!**

- Blueberries are the second most popular berry in the United States.
- Michigan and New Jersey produce 66% of all the blueberries in the United States, followed by North Carolina, Oregon and Washington.
- Over 200 million pounds of blueberries are grown every year in North America.
- Blueberries are first picked by hand to gather the best of the early fruit. Later, if the fruit is to be mechanically harvested, a harvesting machine goes through the field and gently shakes each bush so only the ripe blueberries drop off.
- Blueberries are a good source of Vitamin C and fiber.

## **Cracking Up**

- In the U.S. in 1998, hens produced 6,657,000,000 dozen eggs - that's 6.657 billion dozen! After these eggs were laid, about two-thirds were sold in the shell and one third of them were broken - not by accident, but on purpose. Because after the eggs are broken out of their shells, they can be made into liquid, frozen, dried and specialty egg products.
- The egg shell may have as many as 17,000 tiny pores over its surface. Through them, the egg can absorb flavors and odors. Storing them in their cartons helps keep them fresh!
- Eggs age more in one day at room temperature than in one week in the refrigerator.
- Occasionally, a hen will produce double-yoked eggs throughout her egg-laying career. It is rare, but not unusual, for a young hen to produce an egg with no yolk at all.
- It takes 24 to 26 hours for a hen to produce an egg; there is 30 minutes between each egg-producing cycle.
- About 240 million laying hens produce about 5.5 billion dozen eggs per year in the United States.
- Egg yolks are one of the few foods that naturally contain Vitamin D.

## **Going Bananas!**

- There are over 500 different types of bananas. That means if you ate a different kind of banana every day, it would take almost a year and a half to eat every type!
- Although generally regarded as a tree, this large tropical plant is really an herb. That means it does not have a woody trunk like a tree. The stalk is composed of leaf sheaths that overlap each other and grow from an underground stem called a rhizome.
- The banana plant can grow as high as 20 feet tall. That's as big as a two-story house!
- Bananas are about 99.5% fatfree.
- Bananas are a great source of potassium. Potassium helps build muscle power and keeps your body fluids in balance.
- Bananas are most likely the first fruit ever to be grown on a farm.

## **Macaroni Mania**

- Pasta is one of America's favorite foods. Last year, 1.3 million pounds of pasta were sold in American grocery stores. If you lined up 1.3 million pounds of 16 oz. spaghetti packages, it could circle the Earth's equator almost nine times!
- Noodles got their start in China, not Italy as many people might think.

- Pasta made its way to the New World through the English who found it while traveling through Italy. The English made pasta by cooking it for about a half an hour and then smothering it with cream sauce and cheese. This was the beginning of Macaroni and Cheese!
- America's first large pasta factory was built in Brooklyn, New York in 1848 by a Frenchman who would spread out his spaghetti strands on the roof to dry in the sunshine.

### **An Apple a Day**

- Apples are a member of the rose family.
- Washington state grows the most apples in the U.S.
- The apples from one tree can fill 20 boxes every year.
- Fresh apples float because 25 percent of their volume is air.
- In the winter, apple trees need to "rest" for about 900-1,000 hours below 45 degrees Fahrenheit to flower and fruit properly.
- If you grew 100 apple trees from the seeds of one tree, they would all be different.
- Apples are high in fiber.
- There are more than 7,000 varieties of apples grown in the world.

### **Green Greek Goddess**

- The name asparagus comes from the Greek language and means "sprout" or "shoot."
- Asparagus is a member of the Lily family.
- Asparagus is related to onions, leeks, and garlic.
- One of the most popular varieties of green asparagus is named after Martha Washington, the wife of George Washington.
- California grows about 70% of all the asparagus grown in the United States.
- More than 50,000 tons of asparagus are grown in California every year.

### **Pumpkin Eater**

- Pumpkins were once recommended for removing freckles and curing snake bites!
- Pumpkin flowers are edible.
- Pumpkins are 90% water.
- Pumpkins are used for feed for animals.
- Pumpkin seeds can be roasted as a snack.
- Native Americans used pumpkin seeds for food and medicine.
- In early colonial times, pumpkins were used as an ingredient for the crust of pies, not the filling.
- The name "pumpkin" originated from "pepon", the Greek word for "large melon."
- Pumpkins contain potassium and Vitamin A.

### **Stacking Up!**

- The batter used to make pancakes is almost the same as the batter used to make regular cakes. The pancake batter is just a little thinner.
- Pancakes have become so popular, that people don't just eat them for breakfast anymore. Many people like to eat pancakes for dinner!

- On Pancake Day in Newfoundland (the day before Ash Wednesday, the beginning of lent), items are placed in the pancake batter before it is cooked to foretell the future for family members. If a boy received an item for a trade, it meant he would enter that trade. If a girl received an item for a trade, it meant she would marry a person from that trade.

### **Pretty Peachy**

- Peaches are a good source of Vitamin C.
- The United States provides about one-fourth (25%) of the world's total supply of fresh peaches.
- The peach is a member of the rose family and will have a sweet fragrance when ripe.
- Most peaches that are imported to the United States during winter months come from Chile.
- Peaches are the third most popular fruit grown in America.

### **Pizza Perfect**

- Americans eat approximately 100 acres of pizza each day, or 350 slices per second.
- Each man, woman and child in America eats an average of 46 slices (23 pounds) of pizza a year.
- Pepperoni is America's favorite topping (36% of all pizza orders we eat approximately 251,770,000 pounds a year!
- In America, anchovies always rank last on the list of favorite toppings.
- In 1830 pizza truly began with the opening of the world's first pizzeria. Port' Alba, the pizzas were cooked in an oven lined with lava from Mount Vesuvius, a volcano located on the Bay of Naples.
- Pizza makers have tried virtually every type of food on pizzas, including peanut butter and jelly, bacon and eggs and mashed potatoes!
- According to Domino's, some of the more popular international toppings are pickled ginger, minced mutton and tofu in India, squid (octopus) and Mayou Jaga (mayonnaise, potato and bacon) in Japan, and green peas in Brazil. In Russia, they serve pizza covered with mockba, which is a combination of sardines, tuna, mackerel, salmon and onions. In France, a popular combo is called the Flambee, with bacon, onion and fresh cream.
- There are approximately 61,269 pizzerias in the United States.
- Approximately 3 billion pizzas are sold in the U.S. each year.

### **Broccoli Basics**

- We are eating 900% more broccoli than we did 20 years ago.
- In 1970, consumption of broccoli was only a half a pound per person. Today, the average person in the United States eats four and one-half pounds a year.
- In the United States, broccoli was probably first grown by immigrants from Italy in home gardens in Brooklyn, New York. In 1923, a group of Italian vegetable farmers in Northern California started to grow broccoli commercially and in a few years, they were shipping fresh broccoli to Boston and New York.

## Pick a Pepper

- The most popular sweet pepper in the United States is the bell pepper.
- Most peppers belong to the *Capsicum annuum* species.
- As bell peppers mature, their color changes from green to red and they become sweeter.
- Chile peppers are hot.
- Dried chile pepper wreaths are called "Ristras" - a symbol of plenty and hope.

## Udderly Amazing

- In a year's time a dairy cow produces 1,500 gallons or 6,000 quarts of milk. A Jersey cow will give as much as 3 to 4 gallons or around 16 quarts of milk each day.
- Dairy cows provide us with milk and milk by-products like cheese, butter, and ice cream. In addition, milk is also used to manufacture glue, paint, and plastics.
- Straight from the cow, the temperature of cow's milk is about 97 degrees Fahrenheit.
- The average U.S. dairy cow produces 22.5 quarts of milk each day. That's about 16,000 glasses of milk per year – enough for about 40 people. One cow can give 200,000 glasses of milk in a lifetime.
- It takes approximately 1.4 gallons of milk to make 1 gallon of ice cream.
- Cheese was first made over 4,000 years ago in Asia.
- A cow has 4 stomachs. They are: the rumen, where the food is first stored, the reticulum where food that has been more thoroughly chewed is stored once the cow has chewed the cud and has swallowed it; the omasum where extra water is squeezed out, and finally the food goes to the abomasum. Some of the digested food is then stored in the cow's udder where it is made into milk.
- Cows are ruminants or cud-chewing animals eating hay, corn, soybeans, grass, wheat, and ensilage. Each cow eats 20 to 25 pounds of grain, 40 to 60 pounds of ensilage, 30 pounds of hay and drinks about 15 to 25 gallons of water a day.
- Cows are sedentary animals spending up to 8 hours a day chewing the cud while standing still or lying down to rest after grazing. When going to be milked, a certain cow in an established herd always leads the others with the weaker and older cattle trailing behind the group.
- A typical, full grown Holstein cow weighs about 1,400 pounds and produces 60 pounds of milk per day.
- One day's production is 2.6 pounds of butter or 7 gallons of milk or 6 pounds of cheese.
- A dairy cow consumes 35 gallons of water, 20 pounds of grain and concentrated feed and 35 pounds of hay or silage (a mixture of corn and grass) in just one day.
- It usually takes about 20 minutes for a cow to be milked. On average a cow is milked 2 to 3 times a day.
- Hamburger meat from a single steer will make about 720 quarter pound hamburger patties. That's enough for a family of 4 to enjoy hamburgers each day for nearly 6 months.

## New Ways to Help the Planet

- Farmers and ranchers provide food and habitat for 75% of the nation's wildlife.
- Plant and animal biotechnology have resulted in new antibodies for immunizations. Agriculture has also contributed to research that has helped develop surgical techniques and pharmaceuticals that help save lives.

- Ethanol and new bio-diesel fuels made from corn, soybeans and other grains are beneficial to the environment and helps contribute to energy independence for the U.S.

### **Agriculture is Part of Your Life**

- Products we use in our everyday lives come from plant and animal byproducts produced by America's farmers and ranchers: - Health care: Pharmaceuticals, surgical sutures, ointments, latex gloves, x-ray film, gelatin for capsules and heart valves.
- Construction: Lumber, paints, brushes, tar paper, dry wall and tool handles.
- Transportation: Fuel, lubricants, antifreeze, tires and upholstery.
- Manufacturing: Adhesives, solvents and detergents. Printing: Paper, ink and film.
- Personal Care Products: Shampoo, cosmetics, lotions, finger nail polish and toothpaste. Education: Crayons, textbooks, chalk, desks, pencils and paper.
- Sports: Uniforms, baseball bats, leather equipment and shoes.

### **5 Servings of Fruits & Vegetables A Day**

- Onions contain a mild antibiotic that fights infections, soothes burns, tames bee stings and relieves the itch of athlete's foot.
- Archeologists have found evidence that humans have enjoyed eating apples since 6500 B.C. Each of us eats more than 19 pounds of apples annually.
- Grapes are one of the oldest cultivated fruits. They have been around for more than 8,000 years.
- Americans eat about 125 pounds of potatoes a year, about half from fresh potatoes and half in processed foods.

### **Don't Be Sheepish**

- There are 914 different breeds of sheep in the world. There are 35 breeds in the U.S.
- Wool is a natural fiber grown from sheep.
- The steps to making some of your favorite clothes:
- Sheep are sheared in the spring; their wool is removed in one piece called a fleece.
- Next, the fleece is washed in big tubs to remove dirt, grease and grass, this process is called scouring.
- The clean, dry wool is then carded. Carding means to comb the wool to straighten the fibers.
- The next process is called spinning. This is when the wool will be spun into yarn.
- Finally, the yarn is knitted or woven into fabric.

### **Snack Time**

- It takes a combine 9 seconds to harvest enough wheat to make 70 loaves of bread.
- Americans consume 1.12 billion pounds of popcorn a year.
- Soybean oil is the most widely used edible oil in the United States; you can find it in mayonnaise, salad dressing, process cheese products, dessert frostings and much more.
- Peanuts are not actually nuts. Peanuts, like soybeans, are members of the legume family.
- There are 340 million M&M's produced daily.

## **You May Find this "Corny"**

- One bushel of corn will sweeten more than 400 cans of pop.
- There are about 600 kernels on each ear of corn.
- Farmers grow corn on every continent except Antarctica.
- Each tassel on a corn plant releases as many as 5 million grains of pollen.

## **America's Bread Basket**

- Each American consumer, on average, 53 pounds of bread per year.
- Assuming a sandwich was eaten for breakfast, lunch and dinner, it would take 168 days to eat the amount of bread produced from one bushel of wheat.
- A family of four could live for 10 years off the bread produced by one acre of wheat.
- One bushel of wheat will produce 73 one-pound loaves of bread.
- In 1997, Kansas's wheat farmers produced enough wheat to make 36.5 billion loaves of bread, or enough to provide each person on earth with 6 loaves of bread.
- Farmers receive approximately 5 cents (or less) from each loaf of bread sold.

## **Piggy, Piggy**

- Pigs can't sweat. Pigs have no sweat glands, that is why they roll around in mud to cool off.
- Heart valves from hogs are used to replace damaged or diseased human heart valves.
- A pig can run a 7-minute mile.
- A baby pig, or piglet, weighs about 3 1/2 pounds at birth and will double its weight in just 7 days.

## **It's Presidential**

- George Washington liked ice cream so much he reportedly had a bill for \$200 for ice cream one summer.
- The first ice cream cone was made, served, and eaten in New York City on September 22, 1886. The maker, Italo Marchiony, was granted a patent on his cone mold in 1903.
- Abe Lincoln's mother died when the family dairy cow ate poisonous mushrooms and Mrs. Lincoln drank the milk.

## **We Depend on Each Other**

- Farmers use computers designed and built in cities to track market information, maintain balance spreadsheets, and monitor weather satellites.
- The environment and everyone in it benefits from research on biodegradable plant products that break down easily in landfills.
- Agriculture land provides food and habitat for 75% of the nation's wildlife. Deer, moose, fowl and other species have shown significant population increases in the past several years.
- Genetic engineering with plants and animals has resulted in new antibodies for immunizations. Other research has developed surgical techniques and pharmaceuticals from agriculture that help save lives.
- Ethanol and new bio-diesel fuels made from corn and other grains are beneficial to the environment and promote energy security.

## **Soybeans**

- Soy crayons have been created to replace toxic petroleum-wax crayons, soy crayons are safer to use, brighter in color, and less expensive to produce.
- One acre (43,560 square feet) of soybeans can produce 82,368 crayons.
- Soybean oil is the most widely used vegetable oil. It is found in margarine's, salad dressings, canned foods, sauces, bakery goods, and processed fried foods.

## **Crazy about Cotton**

- U.S. textile mills presently convert over half of the cotton they use into clothing.
- Most of cotton is used for men's and boys' clothing, with jeans, underwear, and shirts topping the list.
- If all the cotton produced annually in the U.S. were used to make one product, such as blue jeans, it would make 5 billion pair.
- One bale of cotton can produce 1,217 men's t-shirts or 313,600 one-hundred-dollar (\$100) bills.
- Cotton's home uses range from bedspreads to window shades. It is by far the dominant fiber in towels and washcloths. Cotton is also popular in sheets and pillowcases.
- Industrial products containing cotton include wall coverings, book bindings, and zipper tapes. The biggest cotton users in this category are manufacturers of medical supplies, industrial thread, and tarpaulins.
- Cotton is a food crop. Almost 200 million gallons of cottonseed oil are used in food products such as margarine and salad dressing. Cottonseed and cottonseed meal are used in feed for livestock and poultry. And even products such as toothpaste, ice cream, and the paper money used to buy them contain by-products of the cotton seed.
- The Cotton Belt covers the southern half of the United States, reaching from Virginia to California. Texas is the top cotton-producing state, harvesting about one-third of the crop each year.

## **The Food We Eat**

- In 1996, each American consumed an average of 77 pounds more of commercially grown vegetables than in 1970, 63 pounds more grain products, 54 pounds more fruits, 32 pounds more poultry, 10 gallons more milk lower in fat than whole milk, 20.5 pounds less red meat, 73 fewer eggs, and 17 gallons less whole milk.
- It takes just 40 days for most Americans to earn enough money to pay for their food supply for the entire year. In comparison with the 129 days it takes the average American to earn enough money to pay federal, state and local taxes for the year.
- More than 96 billion pounds of edible "surplus" food is thrown away in the U.S. Each year. It is estimated that almost 27% of our food supply is wasted.
- Americans are eating about 14 pounds of turkey a piece each year, more than double the rate 20 years ago.

## Appendix 4: Making Sourdough Starter

How did people make leavened bread before they could buy yeast in the store? They made a sourdough starter. Sourdough bread is made by the fermentation of dough using naturally-occurring lactobacilli and yeast. Sourdough bread has a mildly sour taste not present in most breads made with baker's yeast and better inherent keeping qualities than other breads, due to the lactic acid produced by the lactobacilli.

Making a sourdough starter is simple: Stir together some flour and water and let it ferment for a couple of days at room temperature. As the mixture sits, yeast and bacteria already present in the flour wake up and start to multiply, and the mixture evolves into a damp, bubbly, boozy-scented blob. This is your starter—a culture of yeast and bacteria. From here, the starter grows stronger by "feeding" it regularly.

### Materials and Methods

#### Materials:

- ¼ cup commercial flour
- ¼ cup freshly ground flour
- 1 sterile/clean quart bottle with lid
- ¼ to ½ cup boiled water cooled around 100°F (38 °C).
- 1 clean fork for mixing
- Masking tape and marking pen

**Note:** The starter can be made using all commercial flour. The freshly ground flour introduces other yeasts. Starter can also be made by using the starchy water removed from cut potatoes.

#### Methods:

1. Grind 2 cups of hard red or soft white wheat
2. Clean quart bottles in boiling water (10 minutes) or with a mild bleach solution (Soak in a solution of 1 tablespoon of bleach and 1 gallon (3.8 liters) of water for 10 minutes. Be sure to soak the lid as well, and rinse the containers to remove all the bleach.).
3. Add ¼ cup of commercial flour and ¼ cup freshly ground flour to the clean 1-quart bottle.
4. Add ¼ to ½ boiled, cooled water (100 °F [38 °C]) to the flour in the bottle and mix with a fork.
5. Add enough water to make a "thick soup."
6. Loosely place lid on.
7. Use masking tape and marker to label your bottle.
8. Set lid loosely on the top of the bottle.
9. Place bottle on the counter top as directed by the instructor or lab assistant.
10. Check the development of your sourdough starter in 24-48 hours.
11. After 24 hours has passed and evidence of bacteria and yeast growth is apparent, (smell and bubbles) add another ½ cup of commercial flour and ¼ cup, of warm water to the container and mix vigorously. (Vigorous mixing incorporates air into the mixture, which will help the yeast take hold.)

12. Replace the cover and let it sit in a warm place for 24 hours.
13. After 24 to 36 hours, add  $\frac{1}{2}$  cup of commercial flour and  $\frac{1}{4}$  cup of warm water, to the container, and mix as before. (By this time, you should see some change. The batter should smell sour and have small bubbles. If not, your yeast culture might be a slow breeder, just give it more time.)
14. Replace the cover and let it sit in a warm place for 24 hours.
15. At this point, you should have sufficient starter. You need to feed your starter every day or two if left at room temperature and once a week if stored in the fridge. To feed the starter, remove 1 cup of starter from the container (either use it in a recipe or pour it down the drain) and add 1 cup of commercial flour and  $\frac{1}{2}$  cup of warm water and mix as before.

**Note:** In a second lab you will be using the sourdough starter to make bread. Obviously, you will be grinding more wheat than you will use in the starter. Place the extra, fresh, ground flour in a Ziploc bag, label the bag and store it in the freezer for later use.

### Tips

- If at any point a clear light brown to brown liquid develops on the top of the starter pour it off. This is likely the alcohol that is being produced.
- You can “sweeten” the starter by adding 1 to 2 teaspoons of sugar and  $\frac{1}{4}$  cup warm milk when the flour is added during one of the “feedings.”
- Once a month or so, move the starter to a new, sterilized container. This gives you the opportunity to wash the original and prevent bad microbes from taking root.
- Your starter is ready to be used in bread recipes when it becomes foamy on top and smells sour and "beery" -- 8-12 hours after feeding.
- The starter will continue to mature and develop in flavor for years.

### Warnings

- If your starter turns pink or orange, discard it. It should be a very light grey or beige color.
- Sourdough starter is a colony of living creatures. Once it has been established, it is hard to kill, but neglecting to feed it for long periods of time, and heat above 120 degrees F will kill it. Mold can also be a problem, so keep your containers clean.
- If your starter smells bad, it probably is. A pungent starter is okay, but it should not be foul. Also, if the starter has a slimy appearance then it is bad -- perhaps because you fermented it at too high a temperature in which case the bacteria overcame the yeast.

### **Lab Report**

Your lab report should include the following information:

- Protein content of hard red wheat and soft white wheat.
- Type of flour or starch sources you used to develop your starter.
- Notes on the development of your starter.
- Analysis of your final sourdough starter: smell, color, bubbles, approximate amount, and pH.
- An evaluation of the bread made using your starter.

## Appendix 5: How to Do a Lab Write-Up

Your instructor believes in the concept of “writing to learn and learning to write.” On certain labs, you will be expected to turn in a typewritten (word processed) lab report. This doesn't need to be a major production. Writing a report clarifies and reinforces the concepts of the lab.

Follow this simple format for writing your lab reports:

**Name/s:**

**Title of Lab:**

**Date:**

**Introduction:**

<**ATTENTION!** This section states the purpose of the experiment and gives some brief background information. Reading the lab handout will provide information for this section.>

**Summary and Application**

<*This section summarizes what “science” of food science was learned and how it was applied. For example, did the lab involve pH, water activity, bacteria, yeast, enzymes, etc.? Also, any common unit operations used should be described.*>

<Each lab report turned in during this course must follow this format. Be sure to bold face the headings (Name, Title of Lab, Introduction, Summary and Application). Use the spell checker on your word processor before turning in your lab report. Reports are due one week after completion of the lab, and they are due at the first of the class period.>

**PLEASE NOTE:** For your lab report, delete anything that appears between these two marks < >.

## Appendix 6: Foodborne Illnesses and the Microorganisms that Cause Them

ORGANISM	COMMON NAME OF ILLNESS	ONSET TIME AFTER INGESTING	SIGNS & SYMPTOMS	DURATION	FOOD SOURCES
<b><i>Bacillus cereus</i></b>	<i>B. cereus</i> food poisoning	10-16 hrs	Abdominal cramps, watery diarrhea, nausea	24-48 hours	Meats, stews, gravies, vanilla sauce
<b><i>Campylobacter jejuni</i></b>	Campylobacteriosis	2-5 days	Diarrhea, cramps, fever, and vomiting; diarrhea may be bloody	2-10 days	Raw and undercooked poultry, unpasteurized milk, contaminated water
<b><i>Clostridium botulinum</i></b>	Botulism	12-72 hours	Vomiting, diarrhea, blurred vision, double vision, difficulty in swallowing, muscle weakness. Can result in respiratory failure and death	Variable	Improperly canned foods, especially home-canned vegetables, fermented fish, baked potatoes in aluminum foil
<b><i>Clostridium perfringens</i></b>	Perfringens food poisoning	8-16 hours	Intense abdominal cramps, watery diarrhea	Usually 24 hours	Meats, poultry, gravy, dried or precooked foods, time and/or temperature-abused foods
<b><i>Cryptosporidium</i></b>	Intestinal cryptosporidiosis	2-10 days	Diarrhea (usually watery), stomach cramps, upset stomach, slight fever	May be remitting and relapsing over weeks to months	Uncooked food or food contaminated by an ill food handler after cooking, contaminated drinking water
<b><i>Cyclospora cayetanensis</i></b>	Cyclosporiasis	1-14 days, usually at least 1 week	Diarrhea (usually watery), loss of appetite, substantial loss of weight, stomach cramps, nausea, vomiting, fatigue	May be remitting and relapsing over weeks to months	Various types of fresh produce (imported berries, lettuce, basil)
<b><i>E. coli (Escherichia coli) producing toxin</i></b>	<i>E. coli</i> infection (common cause of "travelers' diarrhea")	1-3 days	Watery diarrhea, abdominal cramps, some vomiting	3-7 or more days	Water or food contaminated with human feces
<b><i>E. coli</i> O157:H7</b>	Hemorrhagic colitis or <i>E. coli</i> O157:H7 infection	1-8 days	Severe (often bloody) diarrhea, abdominal pain and vomiting. Usually, little or no fever is present. More common in children 4 years or younger. Can lead to kidney failure	5-10 days	Undercooked beef (especially hamburger), unpasteurized milk and juice, raw fruits and vegetables (e.g. sprouts), and contaminated water

## Appendix 7: Lab Rules

# Food Systems Science **LAB RULES**

1. Act responsibly.
2. Read lab procedures ahead of time; follow instructions.
3. Be familiar with all equipment before using it in the lab.
4. Wash hands before handling food items; avoid touching your eyes, face or mouth with your hands.
5. Wear gloves when handling food items.
6. Weigh product before and after processing; record observations.
7. Wipe up spills from stove tops IMMEDIATELY; turn off burners when not in use.
8. Exercise precaution when working with hot substances and surfaces; wear closed-toe shoes.
9. Wash all items used for meat processing in water heated to 180°F.
10. Use caution when working with knives and other sharp objects.
11. Wash AND dry the dishes you use during lab; Clean as you go and do not leave until you have cleaned up your mess!

**Safety First!**

*Please be mindful of others.*