

APPENDIX 1

GROWING A NATION

THE STORY OF AMERICAN AGRICULTURE

NARRATIVES

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GROWING A NATION

THE STORY OF AMERICAN AGRICULTURE

LESSON 1: 1600–1929

SEEDS OF CHANGE

NARRATIVE

Screen 1: A Life of Possibilities

Imagine you are on a journey to America, leaving behind everything you have known for untold dangers ahead. You are willing to take the risk because you want to start a new life where you will be free to work hard on your own land. The New World means a new life—a life of possibilities.

Across the Atlantic Ocean, in America, historic events are shaping an exciting way of life for common citizens of the United States. Vast, rich lands set the stage for people to make their dreams a reality. Their hard work earns them cash, free time, and a life beyond basic needs. Their system of government is the foundation for this prosperity; established through the good fortune of free, plentiful land and a century long experiment in democracy.

How did the practices of this new kind of government support a revolution in agricultural science, technology, and education? How did agriculture help the United States of America become a prosperous, thriving nation and major world power? Consider the answers to these questions as you enjoy, “Growing a Nation: the Story of American Agriculture.”

Screen 2: Experiences in the New World

The first European settlers in America quickly learned that they had to adapt or starve. During the winter of 1609 to 1610, two-thirds of the settlers in Jamestown, Virginia, the first permanent English settlement in America died. Native Americans taught the survivors how to grow corn, pumpkin and squash. Corn and beans were planted together in small mounds so the bean vines could grow up along the cornstalks. The beans also added nitrogen to the soil. Pumpkins and other kinds of squash were planted between the mounds. Seeds were saved for the next year’s crop. Another Indian-grown plant, tobacco, became the primary cash crop of colonial America. Eventually, through trial and error, the settlers were also able to adapt European crops to the New World.

As the English gained control of America, their merchants sought new markets for colony crops. However, the British government imposed heavy duties on many agricultural products from the colonies and limited the export of more valuable products like tobacco, indigo, wheat and livestock. These restrictions created resentment among the Colonists and were a major cause of the American Revolution.

Screen 3: A Revolution in the Country

Many of the leaders of the American Revolution, including George Washington and Thomas Jefferson, were farmers. Both Washington and Jefferson were interested in experimenting with agriculture. At his Mount Vernon, Virginia farm, George Washington experimented with crop rotation and with new seeds and plants. He also became the Nation’s first mule breeder, using animals given to him by the king of Spain.

Thomas Jefferson also enjoyed experimenting with agriculture on his Virginia estate at Monticello. Both Washington and Jefferson helped organize societies for improving agriculture. These societies were pioneers in agricultural science and education. Some societies issued reports, published journals, and sponsored agricultural fairs to encourage agricultural improvement.

Early Americans were self-sufficient; ninety-three percent of them were farmers, and free land, rich soil, and a temperate climate helped them do well. Farmers began to use horsepower to pull newly invented farm implements like the broadcast seeder and the mechanized grain reaper. These implements improved working conditions for farmers and provided more cash so that they could enjoy a better standard of living. Immigrants came to America in droves, exchanging their own indentured labor for passage to seemingly limitless American freedom, land, and opportunity.

Screen 4: A Nation Divided

By the 1800s the Northern states began to industrialize and export manufactured goods. With room to grow and resources to spare the United States government invested in exploration, opening new territories to farmers and ranchers. Technology was employed to develop transportation systems that brought produce and people together in a national market system. As the Northern states industrialized they attracted new immigrants while the South's population stagnated. In 1800 half of all Americans lived in the South, but by 1850 only one-third of the population was there.

The Southern economy relied on producing and exporting cotton, sugar, rice, tobacco and wheat. The South also depended heavily on food imported from the upper-Mississippi valley. Production of work intensive cash crops like cotton and tobacco expanded and the Southern economy became increasingly dependent on slave labor to keep the price of its crops competitive. Technological improvements like Eli Whitney's cotton gin also helped increase cotton production and made slavery profitable.

The slave-dependent Southern agricultural system worked only for a time. From 1861 to 1865, Americans fought a chaotic Civil War. For the South the war was a struggle to preserve their economy and way of life; for the North it was a struggle to preserve the Union and end slavery. Before the war sixty percent of Americans farmed, but when the war began large numbers of farmers left to fight so their land went untended. When peace was finally declared, many of the South's farms lay in ruin.

Screen 5: The United States Department of Agriculture

In 1862, during the Civil War, President Abraham Lincoln created the United States Department of Agriculture, or USDA. The "people's department", as Lincoln called it, was created to "acquire and to diffuse among the people of the United States useful information on subjects connected to agriculture." That year the Morrill Act also gave each state thirty thousand acres of public land per seat held in Congress, to help build and maintain agricultural colleges. The Hatch Act of 1887 granted additional lands and funds to universities for agricultural research and experimentation. In 1890, a second Morrill Act funded black agricultural colleges.

Government support of science, technology, and education to improve agriculture gave American farmers an edge over the rest of the world. Research into new varieties of foodstuffs (such as navel oranges for California and sugar beets for the Midwest), the introduction of early organic insecticides, and fertilizer testing programs were a few of the early USDA projects undertaken to improve agriculture and life in America. As the USDA shared its discoveries with the American public the landscape began to change. Farmers returning to their crops and livestock from agricultural science schools and agricultural demonstration and extension programs began experimenting with new techniques to improve production.

Screen 6: Rebuilding the South

The Civil War destroyed much of the South and its plantations. More dramatically, four million slaves were suddenly freed with no land, no money and little opportunity. A tenant farming system called 'sharecropping' evolved in the South to make use of cheap labor. Sharecropping employed ex-slaves and other poor workers to farm the cotton and tobacco fields of landowners in exchange for part of the harvest. This system persisted for decades, even though sharecroppers were frequently cheated and exploited.

Men like Booker T. Washington and George Washington Carver worked to improve the lives of former slaves as well as all Southern farmers. Booker T. Washington believed that education was the way to true emancipation. He became the first head of the Tuskegee Institute in Alabama, which emphasized agricultural and industrial training for African Americans.

George Washington Carver was an agricultural scientist who headed the agricultural department at Tuskegee. Carver taught his students how to conserve the soil by diversifying and rotating crops. Carver traveled by wagon demonstrating better farming methods to black farmers. He introduced profitable new crops for Southern farmers to grow in place of cotton. He also developed new varieties of peanuts and discovered new uses for peanuts, giving the South a whole new industry. The United States Department of Agriculture later adopted Carver's demonstration methods, bringing research directly to farmers when it created the Extension Service.

Screen 7: Westward Expansion

In 1870 nearly half of all Americans worked as agricultural laborers and more than three-fourths of America's exports were agricultural goods. Westward expansion pushed the agricultural frontier onto the Great Plains. The Homestead Act offered 160 acres of free land to settlers who would farm it for five years, making the Great Plains a land of opportunity. Homesteaders rushed to fill the open lands. Homesteading also brought fresh waves of immigrants in pursuit of their dreams. The Great Plains soon became America's breadbasket, the rich soil yielding bountiful harvests of wheat and corn.

The United States Department of Agriculture guided and aided much of the nation's agricultural progress during the decades of expansion. It sought out the world's best scientists and engineers; men like Seaman Knapp, who researched and promoted crop rotation and Wilbur Atwater, who started the science of human nutrition. As the USDA collected, analyzed, and published vast amounts of scientific information the frontiers of science and technology were pushed along with the borders of the expanding nation.

Screen 8: Science and Technology for Expansion

The westward expansion of railroads to the Pacific Ocean was extremely important to the growth and development of agriculture. Railroads carried settlers and made it possible for ranchers and farmers in the west to sell whatever they could produce.

Increases in farm production throughout most of the nation's history had come mainly from the development of new land, but by the late 1800s poor farming practices had depleted nutrients in the soil – and agricultural production and quality began to decline. Previously, farmers had just plowed up new land when this happened, but now they began to push for scientific knowledge to improve agriculture. While most farmers had little understanding of the proper treatment of soil or plants, scientists were making new discoveries that would revolutionize agriculture.

Farmers began to form organizations to fight for their interests, improve rural life, and increase agricultural education for their members.

The 1887 Hatch Act established agricultural experiment stations in connection with the Land Grant Universities in each state. The State Agricultural Experiment Stations worked to help farmers find practical solutions to agricultural problems.

Screen 9: Early Agricultural Science and Research

Increasing mechanization continued to improve the productivity of American farmers. Scientists also discovered new crops for American farmers to grow and developed new breeds of livestock to provide more meat, milk, eggs and wool. Consumers became aware of food safety and quality and demanded that the government take action to regulate food.

Scientists also found new ways to fight animal and plant diseases. In 1890, USDA scientists proved for the first time that a disease-producing organism could be spread between animals by a carrier. This groundbreaking discovery led to the development of control measures to combat many other diseases carried by insects that affected animals as well as people, including malaria, typhus, yellow fever and bubonic plague.

USDA scientists also had major success using a predator insect to control an agricultural pest that was ruining California's citrus industry. The Vedalia Beetle was brought into California to control the Cottony-cushion scale insect. The outstanding success of this project led to more research and efforts using predator insects.

By the end of the 1800s, many new discoveries were changing the way Americans farmed. One of the most important scientific advances of this period was the discovery that plants could be selectively bred for disease resistance. The principle of selective breeding expanded to encompass other desirable traits such as drought resistance, plant quality and nutrition.

Screen 10: A New Century For Agriculture

By 1900 industrial technology had brought widespread improvements to farmers. Dams supplied irrigation water to dry land and USDA scientists introduced American farmers to new plants, including nectarines from Afghanistan, broccoli and seedless raisin grapes from Italy and a new avocado from Chile - greatly expanding what American farmers could grow and what ordinary Americans could enjoy at the table.

Foreign demand for America's food surplus increased and Europe became America's largest customer. In 1906

Congress passed the Pure Food & Drug Act. This legislation required the USDA to inspect the cleanliness of agricultural goods. Higher standards for production improved foreign trade and benefited ordinary Americans by providing improved food quality.

As the new century dawned, machines had drastically reduced the amount of manpower required on farms. This increased productivity freed more Americans to pursue new endeavors in industry and in the arts and sciences. Fewer people and less land could now produce the same amount of food.

Screen 11: A War Time Boom

Europe became engaged in World War I in 1914. Busy fighting, these nations struggled to feed their citizens and soldiers. The US Food Administration and the United States Department of Agriculture urged American farmers and ranchers to step up production to meet increased demand at home and abroad. Agricultural exports soared and farm prices more than doubled. This boom renewed business interest in farming, and in 1916 President Woodrow Wilson signed the Farm Credit Loan Act to provide long-term loans to farmers.

With money for expansion, farmers purchased nearly fifty thousand tractors and put forty million acres of new land into production in 1917. The war effort also saw meat production swell by more than 20 percent.

The explosion of agriculture fueled a search for methods to bring more land into production. Agricultural scientists like John Widtsoe developed methods for dry farming that made it possible to grow wheat and hay in arid areas of the United States without irrigation.

Screen 12: A Rural Migration

Despite recent wartime plenty, during the 1920s the quality of life for many rural households was far lower than for city families. Forty percent of rural homes lacked indoor plumbing or electricity, and many farmers began to envy city life. USDA scientists like Dr. Louise Stanly, Chief of the new Bureau of Home Economics, worked hard to apply scientific solutions to the problems of rural families. These efforts led to numerous programs for improving the nutrition of rural Americans.

As Europe recovered from the world war, the wartime market disappeared and created a surplus of products and plummeting prices. Many agricultural producers could not make the payments on loans they had taken out for machinery, land, and seed during the war, and banks began to foreclose on them. A nationwide agricultural depression set in. Over one million farmers had to seek employment in the cities.

Unfortunately, the agricultural depression of the 1920s was only the beginning of the Great Depression, a national crisis that would affect all Americans for another decade to come.

GROWING A NATION

THE STORY OF AMERICAN AGRICULTURE

LESSON 2: 1930–1949

FROM DEFEAT TO VICTORY

NARRATIVE

Screen 1: The Crash Lands

In 1930 the impact of the stock market crash of October 1929 was beginning to be felt in rural America. The price per bushel for wheat and corn plummeted more than 25 percent in a single year. As the depression continued, prices for almost all agricultural products dropped even further. The number of acres harvested and the yields per acre also fell for many crops during the first years of the depression due to severe flooding in some parts of the country, and widespread drought in others. Arthur M. Hyde, the Secretary of Agriculture, called the drought “the worst . . . ever recorded in this country.”

Agriculture was devastated as fields and streams dried up. Even the great Mississippi River was down to historically low levels. Cattle couldn’t be fed, crops failed, money was short, and there was less food on the table. On top of everything else, agricultural exports crashed; reduced a *billion* dollars a year during the early 1930s. It was almost more than America could bear.

During the Great Depression what happened to immigrants and ordinary Americans who had started farms and ranches to accomplish their dreams of a better life in America? How did the Great Depression finally end? What effects did it have on agriculture in America? Consider these questions as you explore, “Growing a Nation: From Defeat to Victory.”

Screen 2: The Struggle to Adapt

As America’s economic depression settled on the country, the Hoover administration made efforts to help. A Federal Drought Relief Committee, headed by Secretary of Agriculture Hyde, was established in 1930. The Committee recommended reduced rail rates for hay, feed, and water and increased road and dam construction in drought areas.

In 1932 the situation worsened for American farmers and ranchers. The price of a bushel of corn dropped from seventy-six cents in 1929 to twenty-nine cents in 1932; beef prices dropped from ten cents to five cents per pound. Nils A. Olsen, Chief of the USDA Bureau of Agricultural Economics, attributed the falling prices to two things: “The *first* has its origins in such revolutionary developments as the change from horses to motors,” and the second, farmers were not adjusting to a “wholly new pattern of production and trade.” Farmers lacked the education and skills they needed to understand how the market was working. It was obvious that the “giant” of the countryside needed better training.

To remedy the problem, the USDA tried to teach farmers to balance supply with demand. They urged farmers to “readjust” by voluntarily planting less of surplus crops like corn and wheat. The USDA also promoted increased production of less plentiful crops; for instance planting tomatoes a little earlier than normal in order to produce a more abundant crop, which would put more money in farmers pockets.

Screen 3: Nothing to Fear But Fear Itself

Although farmers and ranchers experimented with new agricultural methods, the economic situation continued to go downhill for rural America during the early 1930s. President Hoover believed that the economy would fix itself in time, but the storm cloud continued to darken.

As the summer of 1932 turned toward autumn, the depression deepened. Frustrated and angry, Iowa farmers sponsored a Farmer’s Holiday—a strike designed to keep all farm products off the market. The net income of farmers was less than one-third of what it had been in 1929, which meant they earned a *lot* less money. In other areas of the country farmers stormed into towns and simply took what they needed off of grocery shelves. Discontent grew so much that farmers gathered from the Dakotas, Minnesota, Iowa, and Nebraska and pledged to protect one another’s

homes, farms, livestock, and machinery from being taken through foreclosure.

Farmers began to listen to the presidential candidate, Franklin Delano Roosevelt. In a campaign speech Roosevelt declared, “We have no actual famine...our...agricultural mechanism can produce enough to spare. Our government...owes to everyone an avenue to possess...plenty for his needs, through his own work.”

Many Americans became hopeful for change following Roosevelt’s election in November 1933. Roosevelt promised more help through the federal government for Americans suffering during the Depression.

Screen 4: New Hope and a New Deal

President Franklin D. Roosevelt took on the “farm problem” immediately. He told men, women, and children, working in the fields that he understood their struggles because he was a farmer too. He visited poor farmers, shook their hands, and promised change. His wife, Eleanor, was also deeply dedicated. She fought for the rights of sharecroppers and other minority groups in trouble. Together, the new President and his wife firmly believed that solving the agricultural problems facing Americans was fundamental to relieving the trouble caused by the Depression.

Many of President Roosevelt’s “new deal” programs were designed to help farmers, including: the Agricultural Adjustment Acts, the Civilian Conservation Corps, the Farm Security Administration, the Soil Conservation Service and the Rural Electrification Administration. These programs focused on improving farm services, reducing farm surpluses and increasing prices. The USDA and other agencies quickly acted to implement these programs. The goals were to improve the economy and narrow the gap between urban and rural living standards.

Programs like the Tennessee Valley Authority in the Southeastern United States, were created to promote new agricultural techniques, replant forests and improve habitat for fish and wildlife. Electricity generated by newly constructed dams made life easier and farms more productive. Momentous change was on the way.

Screen 5: Agricultural Adjustment

In March 1933, Henry A. Wallace took office as the newly appointed Secretary of Agriculture. His roots lay in Iowa, a large farming state. He was a farmer, as well as a geneticist and farm philosopher. Through his family newspaper, *Wallace’s Farmer*, he had peppered rural America with new ideas aimed at solving their problems. Yet he knew that “no plan could be perfect,” and his first big move, the Agricultural Adjustment Act, was bitterly opposed.

Despite the opposition, President Roosevelt quickly signed the Agricultural Adjustment Act of 1933. It brought immediate change. The Act provided for crop reduction through plow ups (paying farmers *not* to plant) and slaughtering millions of pigs. For example, under the first cotton contracts, growers agreed to plow up twenty-five to fifty percent of their crop before harvest, in exchange for cash payments. Henry Wallace hoped that prices would rise in response to reduced production. Some farmers protested, but the plan showed positive results.

As the Depression continued, the future looked brighter on some days, and more dismal on others. Farmers came to realize that as hard as President Roosevelt, Henry Wallace and others worked to improve farm life, they also needed to do their part.

Screen 6: Dark Clouds for Agriculture

During the first half of the 1930s much of the nation faced devastating drought. Numerous dust storms swept away valuable layers of topsoil across Texas, Oklahoma, Kansas, Arkansas, New Mexico, and Colorado. These dust storms were made worse by the practice of plowing fields and leaving the soil exposed before planting in the spring. The relentlessly blowing winds turned these areas into the “Dust Bowl.” Thousands of farmers were forced to move from the “dust blown deserts of shattered dreams.”

President Roosevelt sent direct aid to provide relief for the hungry and homeless in the dust bowl, and the USDA took action to stop soil erosion. Hugh Hammond Bennett, a soil conservationist and USDA scientist, fought to bring the problem of erosion to national attention. Bennett supported the passage of a Soil Conservation Act to create a Soil Conservation Service at the USDA. The Soil Conservation Act was passed immediately after a dust storm from the Midwest engulfed the Capitol in April 1935. This new law declared soil erosion a menace to the national welfare and authorized broad powers to attack the problem.

The USDA’s soil conservation programs were designed to help farmers change the way they farmed in order to prevent erosion. Members of the Civilian Conservation Corps provided much of the labor to plant native grasses and trees, and helped build ponds on many farms and public lands.

Screen 7: Programs and progress

The first Agricultural Adjustment Act of 1933 was part of President Franklin Roosevelt’s “new deal.” The act led to a reduction in crop surpluses and higher prices for agricultural products. The price supports paid directly to farmers and ranchers for crop reductions under the act and the extra revenue generated by higher prices caused a fifty percent increase in farm income. This eased the burden of the depression on rural America.

However, some people saw the act as unfair because it was paid for, in part, by taxes on those who processed farm products into food and clothing. In 1936 the act was struck down by the Supreme Court. Congress then passed a second Agricultural Adjustment Act in 1938. The new act retained the best features of the earlier program but was funded by general taxation.

While legislative actions were being taken to help farmers, many Americans were dismayed by the disparity of having farm surpluses while many people went hungry. To help alleviate hunger and reduce surpluses the USDA initiated new food programs. The Food Stamps program provided surplus food to poor families and School Lunch programs used surpluses to feed children. The USDA built four new research labs across the nation to find new uses for agricultural products so that farmers could find new markets for their surpluses. Once relief was flowing, attitudes improved.

Screen 8: War Clouds With A Silver Lining

In 1939 the growing clouds of war worldwide caused trouble for American farmers. United States agriculture braced for the unknown as foreign markets closed and surpluses surged higher than ever. Although some expected an economic boom, farmers were asked to produce only what was needed at home. However, the situation quickly deteriorated in Europe and elsewhere. America’s allies needed help—in massive quantities.

Early in 1941 the USDA once again urged American farmers into no-holds-barred production. Hog farmers and cattle ranchers were also told to produce more. The Lend Lease Act of that year guaranteed the Allies food and other supplies. At the same time, officials urged American families to conserve food, fuel and other resources. Although surpluses were high, supplies could run out quickly if America entered the war.

To foster conservation, initiatives such as the National Victory Garden program encouraged people to grow their own food at home. As the manufacturing of new armaments for the U.S. military and its allies swelled, jobs opened up everywhere and great numbers of men and women, especially minorities, left farm work for higher paying jobs in industry. It was obvious that America was growing again.

Screen 9: “Shock Troops” of the Countryside

The war in Europe continued. Although farmers jumped at the opportunity to produce more for the Allies and make more money for themselves, like most Americans they wanted to stay out of the war. Then the attack on Pearl Harbor changed everything. Farmers dedicated themselves to the “defeat of the Axis.” They eagerly adopted science and technology, such as planting hybrid corn, to increase production. Yet even as farm output increased, food rationing went into effect.

Farmers began using more and more machinery to replace animal power. The shift away from horses and mules freed up more land for the production of feed grain for livestock and increased meat production. In 1942, the Food Administration was formed to bolster food production. “Food will win the war and write the peace” became USDA’s slogan.

Life on the farm got busy, even hectic, and by the end of 1942 farm labor became scarce. To stem the tide of men leaving farms to go to war, the Government exempted 1,600,000 men from the draft. These farm workers helped fight the war on the home front. The “shock troops” of the countryside made a major difference. By the end of the war U.S. food and fiber production reached record levels. As one farmer declared in a letter to President Roosevelt, they “had surpassed the efforts of any other class of people in these United States.”

Screen 10: Agricultural Science and Research at War

During World War II the United States Department of Agriculture was directed to intensify agricultural research efforts to meet vital defense needs. Substitutes for rubber, tropical oils, cork and other imported products needed by industry were given priority since the Japanese controlled much of the world’s supply of tropical agricultural products.

USDA scientists also developed better methods of food dehydration in order to supply the troops with nutritious food. They developed dehydrated or “instant” potatoes, new techniques for drying milk, “powdered” eggs, and processes for combining various dried vegetables and meats into prepackaged soups and stews. These improved methods of food preservation helped reduce weight and bulk and made shipping and food storage easier.

New glues, plastics, paints and fabrics were developed from milk, soybeans, cotton and many other agricultural commodities. Wood building techniques developed by USDA scientists were used in American bombers. The military adopted aerial mapping and photography techniques that had been pioneered by the USDA Forest Service and Soil Conservation Service. After the War, private industry commercialized many of the products developed by USDA researchers.

Of all these endeavors, the mass-production of penicillin became the most important contribution of agricultural researchers during World War II. The result of this research saved the lives of millions of people, and after the war it launched a new pharmaceutical industry. Agricultural science made a tremendous contribution to winning the war.

Screen 11: The Post War Boom

As World War II ended, thoughtful preparation was required to prevent the return of agriculture to pre-war Depression conditions. Four million acres of crops were plowed up and a peacetime economy was formed.

However, the need for food in war-torn Europe and Asia remained high. In 1948 the United States Congress passed the Marshall Plan to meet this need, and American farmers carried on with their important work. Former USDA Secretary Henry A. Wallace had once said that the U.S. has a “moral responsibility to feed the hungry people of the world.” The United States sent millions of tons of food abroad to prevent mass famine in the years after the war. Under the Marshall Plan livestock, seed, fertilizer and farm machinery were also sent overseas to help rebuild Europe’s agricultural system and European farmers visited the United States to learn American farming techniques.

As the world entered the post-war recovery period, agricultural improvements continued with new research in plant and animal science, human nutrition, soil conservation, and research into new food and agricultural products. When Congress passed the G.I. Bill in 1944, providing Veterans with educational and other benefits, enrollment in land grant colleges soared. More and more men and women graduated and took agricultural jobs off the farm with the goal of feeding the world. A post war boom was in motion, and major changes in the field of agriculture lay on the horizon.

GROWING A NATION

THE STORY OF AMERICAN AGRICULTURE

LESSON 3: 1950–1969

PROSPERITY & CHALLENGES

NARRATIVE

Screen 1: Peace and Prosperity

At the end of World War II, prosperity brought both opportunity and change to American agriculture. The Marshall Plan was enacted, which helped U.S. farm exports skyrocket from around two billion dollars in the 1940s to nearly four billion in 1950. The Marshall Plan helped restore the European economy while feeding millions of people. American farmers prospered due to record agricultural production and prices. By the late 1940's, President Harry S. Truman could honestly say, "The American farmer has reached an economic position better than he had ever known before."

Life in the United States changed. A higher standard of living increased home and car ownership and brought more educational opportunities for many Americans. A whole new economy based on consumerism was created as television images increased the public's appetite for all kinds of new products.

Science and technology were changing the way America farmed. Farms became mechanized and new pesticides, weed killers and chemical fertilizers increased crop yields.

As agriculture became more efficient there were fewer but much larger farms. Fewer people were needed to work on farms, and many families were free to pursue new dreams; so they left the countryside for work in the city and homes in the suburbs.

How would American agriculture cope with the changes prosperity brought after World War II? How would these changes affect individual farmers and ranchers? How would progress in agricultural science change America and the world? Consider these and other questions as you explore, "Growing a Nation: Prosperity and Challenges."

Screen 2: The Cold War Gets Hot

In 1950, Communist North Korea invaded South Korea. Once again the United States re-armed, with agriculture playing a fundamental role. The U.S. military and Korean civilians needed new food supplies. In July, 1950 President Truman ordered the U.S. Department of Agriculture to increase agricultural production for the war. Part of the push to re-arm required farmers to increase or decrease production of specific farm products, a course of action that World War II practices had already prepared them to accept. The American public was again asked to conserve food supplies by growing gardens at home. The war became an economic boom for farmers who had crops to sell and families to support.

The USDA also stepped up research during the war, in order to assist the military in solving the scores of new problems brought on by modern warfare. New fabrics were developed to help shield soldiers from burns, and to help protect wounds from infection. Dextran, a sugar produced from bacteria acting on cane or beet sugars, was developed to assist blood transfusions. The USDA's civilian research programs also continued during the 1950s. Their work dramatically improved the flavor and stability of soybean oil, making this once insignificant crop one of America's most important products. Agricultural research increasingly made invaluable contributions to modern society.

Screen 3: The Changing face of food and farming

Farms changed considerably during the Fifties. In 1950 the average farm was two hundred and thirteen acres; by 1960 it was two hundred and ninety-seven acres and growing. The number of large-scale commercial farms continued to increase because they were more efficient and productive. Modernization, such as the introduction of the mechanical cottonpicker and the mechanized processing of peas from vine to freezer, became the goal of many producers and processors in the United State's rapidly shifting agricultural economy. Farmers who owned smaller farms had to seek extra income from other employment, or form "cooperatives" to compete with large-scale commercial

agriculture enterprises.

American eating habits changed along with American lifestyles. In 1954 T.V. dinners were introduced and became an instant success. Fast food restaurants became popular after the first McDonalds franchise was bought in 1955. More and more prepared foods entered the marketplace while supermarkets began to replace the corner grocery store. The frozen food industry boomed as Americans bought larger refrigerator freezers and sought more convenience foods. The number of working wives increased by fifty percent during the 1950s, and the percentage of working women with children also rose. Food preparation needed to be quick and simple for the new American family. Improvements in refrigeration, transportation and processing enabled Americans to enjoy a wide variety of foods while spending less of their income on food than ever before.

Screen 4: A Free Market to Fight the Surplus

When President Dwight D. Eisenhower took office in 1953 he believed that government had imposed too many rigid federal controls on farmers that bottlenecked the flow of business, and took away competition in agriculture. Under the leadership of Eisenhower's Secretary of Agriculture, Ezra Taft Benson, the USDA reorganized to meet the changing needs of American agriculture. Benson believed that adequate research and education programs in the production, processing, marketing and utilization of farm products were the best means of promoting the welfare of farmers and the nation.

When the Korean War ended, in July 1953, surpluses caused dramatic price drops for farm products. The federal government established programs to encourage farmers to produce less once again, and worked to develop new markets for agricultural products.

In 1953 the USDA established the Agricultural Marketing Service to seek solutions to the problems of surpluses and help "bring consumers adequate supplies of wholesome farm products at reasonable prices." This service worked to improve the packing of perishable fruits and vegetables, establish better warehousing and food storage systems, and develop new terminal facilities in large cities; all to save both growers and the public money and improve the quality of America's foods.

Screen 5: Science and Technology – Great Expectations

The changes in agriculture during the 1950s were not brought about by government policy alone. In 1953, the USDA established the Agricultural Research Service to focus its research efforts on a national scale.

Agricultural scientists were busy developing better breeds of plants and animals, and new techniques to stop insects from destroying entire crops. Research conducted by Edward F. Knipling of the USDA, using the sterile insect technique (a method of biological control) led to the eventual eradication of the screwworm, a parasite that had caused severe losses of livestock for many years. Time-temperature research by USDA scientists during the Fifties also solved numerous frozen food taste and quality problems, and helped this new industry boom. In addition, USDA scientists developed new products such as washable woolens, new cotton fabrics and better methods for making leather goods. USDA scientists also developed DEET, a widely used and highly effective insect repellent, for the Armed Forces.

In 1954 American agriculture passed a technological milestone when the number of tractors on farms exceeded the number of horses and mules for the first time. In 1956 an Interstate Highway Act was passed to build modern freeways across the nation, which made it faster and easier for people to travel and to ship agricultural products across America.

Screen 6: Peace, Prosperity, and Growth

As the 1950s drew to a close, a revolution in American agriculture was in full bloom. Low cost fertilizers, such as anhydrous ammonia, were widely used to renew the nutrients in exhausted soil. New pesticides and herbicides also led to even greater increases in farm productivity. By 1960 a farmer could produce sixty bushels of corn per acre, compared to only thirty bushels of corn per acre in the late 1940s. By 1961 one farmer could feed twenty-seven people, compared to feeding only eleven people in 1940.

Public Law 480, The Food-For-Peace program, was created in 1954 to help use the surpluses resulting from the great increases in agricultural productivity. This program authorized the USDA to buy surplus U.S. farm products

for distribution to countries struggling to feed their own people. American farmers benefited from the increased exports while thousands of people in recipient countries were saved from hunger.

As fewer people were working on farms in rural America, the federal government began a rural development program to bring together the resources of the USDA, other government agencies and private enterprise to help diversify rural economies. This program provided more opportunities for job training and promoted the development of business and industry outside of cities.

Screen 7: The War on Poverty

When President John F. Kennedy was elected in 1960, he promised a broader government role in rural America. By then the definition of rural populations had expanded beyond people involved in agriculture to include those working in manufacturing, mining, or recreation; retirees; college students; and military personnel stationed at military bases in rural areas. The exodus of people from rural America that began after World War II continued during the 1960s and added to the unemployment, congestion, and poverty of inner city America. However, the rural poor were often worse off than the urban poor since they had less access to social programs aimed at alleviating poverty.

President Kennedy felt obligated to reach out to the rural poor and to help small-scale farmers. He guaranteed price supports again, reversing the trend toward free market government policy. Direct federal payments to farmers between 1959 and 1962 more than doubled, to \$1.7 billion dollars. One of Kennedy's first acts as President was the expansion of food programs to assist needy families throughout the United States. Using the model of programs from the 1930s, the USDA expanded the school milk program and piloted a new Food Stamp Program to use America's farm abundance. The Food-For-Peace program was also expanded to distribute agricultural surpluses abroad. Through this program, surpluses went to even more third world nations in order to help them develop, and to increase America's influence in the world. Speaking of America's agricultural abundance, Kennedy said, "I don't regard the agricultural surplus as a problem. I regard it as an opportunity."

Screen 8: The Great Society

After President Kennedy was assassinated in November 1963, President Lyndon B. Johnson continued to extend government programs for agriculture, with more food stamp acts and more incentives for farmers to decrease production. He also tried to help farmers by pushing forward a "program to make available our farm surpluses to assist in feeding and clothing the needy in Asia." As it had before, American agriculture helped fight a war: the Vietnam War in Southeast Asia.

At home, President Johnson promoted a program called "The Great Society" to tackle a variety of social issues in America, including the problem of rural poverty. Despite the poverty of the 1960s, many of America's farming communities could expect a standard of living comparable to that of the nation's urban dwellers, and better than most farmers could expect almost anywhere else in the world. Secretary of Agriculture Orville Freeman commented that, "America stood above all nations" because of "Scientific Agriculture."

The fruits of research during the 1960s were staggering. USDA research led to the development of new processes such as automated irrigations systems, and new products like permanent press cotton fabrics that could compete with synthetics. A range of crop and livestock diseases were identified, researched and treated. Better breeds of animals, and new plant varieties (including Fortuna wheat, Rainer cherries, and Hood strawberries), provided even more abundant and inexpensive food for Americans.

By the end of the decade, advances in transportation and storage, the decentralization of livestock markets and the dominance of supermarkets set the pattern for the future of American agriculture.

Screen 9: New Challenges

American society had benefited greatly from science and technology during the years after World War II. However, during the 1960s people became increasingly aware of the effects of pollution on the environment. In the early 60's, Dr. Rachel Carson condemned the widespread use of chemicals in the environment in her controversial book *Silent Spring*. Her 1963 testimony before Congress led to dramatic changes in the years ahead. The need to conserve and protect the environment became clearer to the American public.

Public concern for environmental protection brought more changes to American agriculture. In 1967 USDA Secretary Orville Freeman reported that 186 million acres of land were secure in National Forest and Grassland programs, and thirty thousand farmers were using part of their land for income-producing recreation. Farmers had an increased awareness of the need to preserve open spaces and watersheds, and to improve wildlife resources.

By 1970 the environmental movement generated by Dr. Carson's book was in full swing. The Federal government consolidated the functions of various agencies related to pollution and environmental monitoring and protection into one new agency. On December 2, 1970 the Environmental Protection Agency (or EPA) was established. This led to a host of Federal environmental protection acts which addressed the problems of pollution. Following the advice of four government committees looking into pesticide usage, the pesticide DDT was gradually phased out and then banned at the end of 1972. By that time many insects had already become resistant to the chemical and more effective control measures were being developed.

Screen 10: Farming for More than Food

Richard M. Nixon became President in 1969. Although his administration was heavily involved in trying to end the Vietnam War, he also set a goal to improve nutrition for Americans. President Nixon convened a conference in 1969 to explore ways to help Americans suffering from malnutrition. "The moment is at hand to put an end to hunger in America...for all time", he said.

Many of the actions resulting from this White House conference involved assistance programs operated by the Food and Nutrition Service of the U.S. Department of Agriculture. These included: additional nutrition research, extending the food stamp program, free or reduced price school lunches for low income children, and specific nutrition programs for vulnerable groups like pregnant women, infants and children. Once again the Department's role was expanded as improving nutrition, and protection of our natural resources and the environment became priorities for USDA's research and food assistance programs.

By the 1970s the total farm output of the United States had increased by more than fifty-two percent since World War II, with six percent fewer acres of land in production and sixty percent fewer hours of labor required. Farmers made up less than five percent of the United States labor force, yet they fed the rest of the nation and many of the people of the world.

Screen 11: Results from Research

Overall, 1950 to 1975 was the most dramatic period for agricultural change and progress that the nation had seen. The success of American agriculture during this period of change made it possible for the U.S. to turn its energies to other scientific and technological achievements. In July, 1969 astronauts Neil Armstrong and Edwin "Buzz" Aldrin landed on the Moon. The photographs they took of our own fertile planet from that barren world emphasized that the Earth is a unique oasis of life.

Fittingly, it was at this time that America's agricultural revolution was being exported to the world. This "Green Revolution" began in 1946 when USDA agronomist S. Cecil Salmon was working in war torn Japan. He discovered a small, or dwarf, variety of wheat with a heavy head of grain called Norin No. 10. During the next thirteen years Dr. Orville Vogel and other Department of Agriculture researchers bred many varieties of this wheat. Eventually they developed a highly productive strain called the Gaines Dwarf. Dr. Norman Borlaug, an American scientist working in Mexico, bred the Gaines Dwarf for the tropics and introduced his new varieties to India during their famine in the 1960s. His work saved a billion lives. For his humanitarian efforts Dr. Borlaug was awarded the Nobel Peace Prize in 1970.

American agricultural, scientific and technological innovations, along with other international efforts had started a global agricultural revolution. This "Green Revolution" would have an immense impact on the future of America.

GROWING A NATION

THE STORY OF AMERICAN AGRICULTURE

LESSON 4: 1970–PRESENT INTO A NEW MILLENNIUM NARRATIVE

Screen 1: Boom of the 1970s

Farmers made up only 4.6 percent of the American workforce in the early 1970s, yet this tiny minority generated nineteen percent of the United States' exports. At the same time they fed an unprecedented average of forty-eight people per farmer, many of those outside the United States. It was what American farmers had been striving for—a period of growth and prosperity.

The Soviet Union, (then the world's largest nation) along with various smaller countries in the communist bloc, opened their borders in 1970 to agricultural trade with the United States. In 1972, the Soviet Union experienced a major wheat crop failure. During this time additional crop failures outside of North America spurred massive foreign buying of American grain. Commodity prices soared, and farmers prospered. Farmers were encouraged to expand and increase production to take advantage of the booming market. Farmers took out loans, bought land and invested in cutting-edge technologies such as innovative irrigation systems, specialized and more efficient farm machinery, and new pesticides and herbicides. Flourishing foreign trade with the Soviet bloc enlarged the export market for agriculture, and American farmers reaped robust profits.

How long would this new cycle of prosperity last? How would American agriculture adapt to the challenges of a global economy? How would agriculture adapt to an increasingly complex and technological world transitioning into a new era in history? Consider these and other questions as you explore, "Growing a Nation: Into a New Millennium."

Screen 2: Energy Crisis

The energy crisis dominated world events during the 1970s. In October 1973, the Arab members of the Organization of Petroleum Exporting Countries (or OPEC) refused to ship oil to the United States, Western Europe or Japan in retaliation for their support of Israel during the Yom Kippur War against Egypt. The price of oil rose dramatically, triggering a worldwide energy crisis and economic recession. The Western world, especially the United States, had long taken energy for granted. Now there were shortages, rationing and long lines to purchase gasoline. The Federal Government imposed a nationwide speed limit of fifty-five miles per hour, created a strategic petroleum reserve and formed the Department of Energy. The energy crisis also affected farmers because modern agriculture depended heavily on petroleum-powered equipment and on fertilizers derived from natural gas. The energy crises generated interest in developing renewable energy sources, including growing crops to produce fuel.

Higher energy costs caused crop and livestock prices to surge and remain elevated until nearly the end of the decade. Farm land values remained high and interest rates low, which encouraged many farmers to take out large loans for the purchase of land and machinery.

Screen 3: Global Agriculture

International trade doubled during the 1970s. Early in the decade President Nixon devalued the dollar, which made American products more affordable overseas. This, along with bad weather in competing agricultural nations around the world, increased the demand for American agricultural exports. By the end of the decade agriculture and the rest of the United States economy had become dependent on international trade. A global food and agricultural system was emerging which would greatly reduce food insecurity throughout the world, but would also put American farmers in direct competition with farmers in other countries.

Agricultural scientists increased the American farmer's competitive edge in this growing global marketplace with new research initiatives for small farms, solar energy, and energy conservation. They developed hundreds of

improved varieties of fruits, vegetables, cotton, wheat and other crops (including carrot varieties with twice as much beta-carotene, an important nutrient).

Researchers made great strides in animal health. For example, agricultural scientists made important advances toward developing a vaccine for foot and mouth disease. Hog cholera was eliminated in 1978. This contagious disease of swine had killed enormous numbers of pigs for more than a century and cost pork producers tens of millions of dollars in losses each year.

Screen 4: The Farm Crisis of the 1980s

Unfortunately for farmers, the boom of the 1970s, which encouraged them to expand production, would come to a disastrous end. The economic opportunities of the early Seventies pushed farmers to take advantage of growing exports. Since easy credit helped finance the expansion, many farmers took on too much debt - which left them vulnerable to changes in the economy.

Economic changes were not long in coming. Export markets began to shrink in the early 1980s because of European subsidies, and interest rates in the United States rose. Then, in January 1980, President Jimmy Carter cancelled sales of American grain to the Soviet Union in response to the Soviet invasion of Afghanistan. Compounding these problems, periods of drought during the decade affected many regions of the country.

Following his inauguration, President Ronald Reagan signed the 1981 Farm Bill to help American farmers compete with European farmers again. But even with government help farm prices, income and land values continued to decline. This made it increasingly difficult for many farmers to pay their debts. These economic challenges produced the most severe financial stress for American farmers since the Great Depression of the 1930s.

Screen 5: Ending the Farm Crisis

Many protests broke out around the nation in response to hard times for American agriculture. The Farmers Home Administration placed a two-year moratorium on farm foreclosures in 1983, and many banks held off as long as possible on past due loans in order to assist desperate farmers. Eventually, though, many farmers were forced out of business.

Growing concerns about the effects of agriculture on the environment brought about a merger of crop support payments and resource conservation in the 1985 Farm Bill. This Farm Bill was the first to contain conservation requirements. The new law mandated that farmers implement conservation farming practices in order to receive benefits from USDA.

As a result of the new farm bill, the Department of Agriculture initiated the Conservation Reserve Program to pay landowners to protect environmentally sensitive cropland by planting trees, grass and other ground covers in place of agricultural crops. Additionally, USDA began to put more emphasis on natural resource protection in its research programs. Scientists and engineers provided farmers and other land owners with science-based information and technical assistance to help them manage their land in environmentally sound ways.

Ultimately, expanding trade was seen as the essential solution to ending the agricultural crisis American farmers faced in the 1980s. In order to further fair trade President Reagan agreed to begin a series of trade negotiations in 1986, known as the Uruguay Round. These negotiations lasted from 1986 to 1994 and led to the 1995 creation of the World Trade Organization (WTO), which set rules for trade between nations.

Screen 6: Alternative and Sustainable Agriculture

The farm crisis of the 1980s also led more farmers away from traditional crop production and toward growing alternative or high-value crops that were becoming increasingly popular with consumers. These included: commercially growing herbs and wildflowers; fish-farming by raising fish like catfish, crayfish and freshwater shrimp; and organic farming which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives in agricultural production.

Many farmers during this period also began to consider a wholly different approach to agriculture called sustainable agriculture, or a system of farming that maintained its productivity and usefulness to people forever. Sustainable agriculture was seen as being achievable by adopting methods of farming that conserved natural and farm resources, protected the environment, enhanced people's quality of life, and allowed farmers to stay economically competitive.

In 1988, the USDA started the Sustainable Agriculture Research and Education program (or SARE) as part of

its Cooperative State Research, Education, and Extension Service. This program funded projects and conducted outreach to improve agricultural systems and to help advance farming systems that were profitable, environmentally sound and good for communities.

Screen 7: A New Way to Manage the Farm

During the 1990s farm management became increasingly important. Because the cost of inputs (the things a farmer needs to produce a crop) rose sharply during the 1980s, farmers needed to become better business managers and computer users in order to succeed.

In response to these problems USDA scientists and their university partners worked to help farmers reduce their production costs and increase their efficiency. For example, precision agriculture and the use of computers were introduced during this decade as a way to manage smaller areas within fields instead of managing whole fields. By using site-specific information and global positioning satellites, or GPS, farmers could more efficiently manage pests, nutrients, seeding rates, water and other resources.

Another innovation that became widely practiced by farmers during these years was conservation tillage systems. These systems involved leaving leftover crop stalks on the soil surface, mainly to control erosion. This practice resulted in greater water conservation and reduced run-off into streams and lakes, which better protected the environment.

This decade also saw an increased concern for preserving and protecting America's irreplaceable farmland - land that has been farmed for generations and that is essential for producing our food and providing us with scenic open space, wildlife habitat and clean water. To stop the losses of this vital resource both private and government groups were founded to protect land that was becoming increasingly at risk from urban sprawl and rural subdivisions.

Screen 8: Better Times

The world underwent dramatic changes during the 1990s. The Berlin Wall that had stood for twenty-eight years as a symbol of the Cold War came down in May 1989; and by December 1991 the Soviet Union was no more.

The economy of the 1990s was one of rapid growth highlighted by a stock market boom that was fueled by emerging Internet businesses. Inflation and unemployment were at historic lows. This economic boom was enhanced by instantaneous telecommunications and new information technologies.

Innovative information technologies opened up vast new frontiers for science. The Human Genome Project identified approximately thirty thousand genes in human DNA and made this information publicly available to scientists everywhere. Similar genome projects were started for farm animals, plants and microorganisms. In 1996 Dolly the sheep, the first cloned farm animal, was born. Government and private investment helped launch a multi-billion dollar biotechnology industry to develop new medical and agricultural applications.

Conditions for farmers also improved during the 1990s. Low interest rates meant farmers had less debt. In 1992 President George H. W. Bush signed the North American Free Trade Agreement (or NAFTA) between the United States, and Canada and Mexico, which eliminated trade barriers and facilitated trade among the three countries. NAFTA resulted in a dramatic rise in food exports to Canada and Mexico. Export levels of U.S. agricultural goods reached new highs in the mid-1990s.

Screen 9: Increased Safety and Efficiency

After a series of highly publicized food related deaths caused by unpasteurized fruit juice and undercooked fast food hamburgers during the mid-1990s, there was a public outcry for more food safety regulation. In January 1997, President Bill Clinton launched the President's Food Safety Initiative to promote public health and improve food safety.

Following this initiative, the USDA took steps to improve food safety from the farm to the table. Scientists developed methods to reduce levels of bacterial contamination on livestock and rapid tests to identify germs in food. Research proved that irradiation was safe and effective, although expensive, for decreasing or eliminating harmful bacteria in meat, poultry and other foods (including fresh fruits, vegetables, and spices).

As the public demand for high quality and safe foods increased, many small farmers found success by aggressively marketing their organic and specialty products to consumers.

Meanwhile, large agribusinesses began contracting with farmers and ranchers to raise products that specifically

met their needs and standards. This system, called vertical integration, allowed food companies to control the quantity, quality, and price of their foods from farm to fork

By the end of the 1990s it was clear that farming had changed. Farms were larger but fewer in number, and both small and large farms were more specialized and more efficient.

Screen 10: Into the New Millennium

In the year 2000 the food and agriculture sector contributed \$1.3 trillion – or thirteen percent – to the American Gross Domestic Product, and employed seventeen percent of the labor force.

In 2001 President George W. Bush appointed Ann M. Veneman to serve as the Secretary of Agriculture, the first woman to hold this important position.

Today, significant changes are happening for every aspect of American society. Advances in science and technology are fueling a global economy. The pace of scientific research is accelerating. International trade, with ninety-six percent of the world's population living outside of our nation's borders, is expanding.

These changes bring American farmers fresh and complex challenges. New foreign pests and diseases emerge each year to threaten agricultural production. Terrorists exist who pose a threat to the nation's food supply. Food safety, nutrition and obesity are becoming increasingly serious health concerns for consumers.

To address these challenges agricultural scientists and American farmers need to continue using the latest tools and technologies and to work closely together to keep agriculture competitive and to ensure that all Americans have access to a wide variety of safe, healthy and plentiful food. More young Americans also need to seek careers in the food industry and the agricultural sciences to meet the future needs of our nation.

American agriculture has greatly changed since its beginnings over two centuries ago but it is still the foundation of America's continuing experiment with democracy and a good life for our nation's citizens – a life of possibilities.