Fair Education Program
Grades 6 – 8

The following activities are designed to make your visit to the fair more meaningful. You can use them as stand-alone activities or incorporate some of the ideas into your regular curriculum.

Activities can be used in grades 6th-8th, so standards listed are the anchor standards for this grade span.

Standards: English Language Arts

Reading

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

Craft and Structure

1. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
2. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
3. Assess how point of view or purpose shapes the content and style of a text.

Integration of Knowledge and Ideas

1. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.*
2. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
3. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Writing

Range of Reading and Level of Text Complexity

1. Read and comprehend complex literary and informational texts independently and proficiently.

Text Types and Purposes*1

1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

Production and Distribution of Writing

1. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
2. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
3. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Research to Build and Present Knowledge

1. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
2. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
3. Draw evidence from literary and/or informational texts to support analysis, reflection, and research.

Language

Knowledge of Language

1. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

Vocabulary Acquisition and Use

1. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.

Comprehension and Collaboration

1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.

Listening and Speaking

Presentation of Knowledge and Ideas

1. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
2. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
3. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

Overview of the Knowledge:

1. Students demonstrate accurate knowledge and speaking effectively about the topic.
2. Engage in research and inquiry to investigate topics, and to analyze, integrate, and present information.
3. Determine main ideas are supported by key details of a text.
4. Utilize note-taking strategies to better understand a text.
5. State a claim as an assertion of the truth that can be disputed.
6. Write an essay using the organizational structure of opinion/argumentative writing.
7. Collaborate to develop a presentation using a variety of sources.
8. Understand the development and history of the Big Fresno Fair.
9. Understand the importance of agriculture to the economy of the central valley and the state of California.

Culminating Project or Summative Assessment:

1. A persuasive presentation designed to acquire funding for an agricultural venture. The research is used to support the persuasive nature of the presentation.
2. Have students individually or in a collaborative small group write a detailed report as if they were applying for a business loan. They will be requesting money to raise the crop or animal of their choice. They will orally present a 5-7 minute PowerPoint, as if to a bank loan officer, They should include pictures, graphs, or anything that enhances their report. The report should also include costs involved in growing their crop or animal, such as equipment, labor, fertilizer, crop sprays, etc.. They should include how they intend to market their crop or animal. They should be able to correlate some of the occupations and businesses they had listed in their pre-fair activity to their farming venture.
3. We Garden: My Life as a Fruit or Vegetable http://www.learnaboutag.org/resources/table_we.cfm
4. Explain to students that they will write a fictional, creative story about life as a fruit or vegetable from the farm to the table. The students will need to answer as they write their story about the production and development of a specific produce item. The story should be written in first person narrative, with the fruit or vegetable telling the story. The writing process will include brainstorming, writing rough drafts, peer editing, and illustrating. Stories can be entered into a story writing contest, details: Imagine This http://www.learnaboutag.org/programs/contest_details.cfm

Essential Questions

How can research support a persuasive speech?
How can content be presented in diverse media and formats, including visually and quantitatively, as well as in words?

Lesson Sub-Questions	Skills	Activities	Resources and Tools	Teacher Notes
What learning experiences, text, and multimedia will promote deeper understanding of a topic? How can I analyze a text by reading closely? How does a researcher evaluate and utilize credible sources? How do I convince others I know what I am talking about? How can knowledge of a topic be built by multiple sources and formats? How can students work together collaboratively to gather information and present it to the class? How can a diagram be used to clarify information? From a demonstration, How can you infer the various effects, problems, and benefits in a real world situation? How can taking notes during a multimedia presentation increase comprehension? How can real life demonstrations build knowledge?	Comparing and contrasting two items to note similarities and differences Review the key ideas expressed and explain their own ideas and understanding in light of the discussion Use valid reasons and relevant information, including specific facts and details, to support claims (opinions) Determining the main ideas and key details of a text Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation Collect data and analyze the results Collegial conversations with others help to build and clarify your own ideas Identifying the points made in a text and/or multi-media and explain how an author supports each point	How does milk get from the farm to the table? Watch the video, The Journey of Milk. Have students take notes on the video so that they can create a diagram showing the journey milk takes from the cow to the table. Discuss the possibility of choosing dairy farming as their report topic. What is one natural resource that is critical to life on the farm? Have you seen the sign alone Highway 99, “Where water flows, crops grow”? 1. Examine the affect of watering duration and frequency on plant growth by manipulating one variable. Beginning with the same amount of water, irrigate one plant with more water less often and one plant with less water more often. 2. Fill three plastic cups; one with soil, one with gravel, and one with sand. Predict which cup will hold the most water. Pour water into the cups to test your predictions. 3. Discuss the water cycle and how evaporation, condensation, transpiration and precipitation affect agriculture. Students can draw a diagram of the water cycle and label parts of the process. 4. Place a rain gauge outside your classroom and record the precipitation in your area. 5. Research the seasonal rainfall averages in your area. What crops could be supported by this rainfall	Student experiences Teacher Resource “History of the Fresno Fair” California Agriculture Overview National Agriculture in the Classroom http://www.agclassroom.org/teacher/matrix/resources.cfm?rid=146 California Agriculture Overview Teacher lesson plans http://learnaboutag.org/ Complete lesson that gives students an appreciation about California as a major agricultural state, gather production information about California grown commodity to create written report. We Garden: California Crops California Crops PDF www.learnaboutag.org/resources/lesson/we_ca.pdf Large wall map of California Reference books on fruits and vegetables. Commodity cut-outs. Double-sided tape. California Produces map www.cfaitc.org Animal Fact Sheets Teacher Resources: Fresno County Products Animal Facts California produces more than 400 different agricultural commodities, providing an abundance of fruits, vegetables, nuts, milk, nursery plants, flowers, fiber and	

How can knowledge be shared in different formats?	Gathering, collaboratively discussing, and integrating information from several sources to write knowledgeably about topic Following steps in a process and analyzing results Taking notes using a graphic organizer Creating a timeline to organized information	average? 6. Locate newspaper articles that cover local, state and federal water issues. (drought) Discuss how they affect the students' present lives. 7. Watch the video on drought, and discuss how this plays a part in agricultural decisions. As students watch the video have them independently jot down their thoughts in a Bubble Map. Discuss as a class and create class bubble map with key ideas. 8. Have students write a description of scenes from the video presentation. Become an Erosion Expert **Objective:** Demonstrate how ground cover can slow and prevent soil erosion. Materials Needed: Wide mouth jars; funnels; topsoil; grass clumps (including roots and soil); water; watering can; leaves; pine needles; rocks **Steps:** 1. Define erosion as the breakdown and runoff of soil. Identify ways that erosion can occur. Ask students to brainstorm why erosion can be harmful. 2. Place a funnel at the top of a wide mouth jar. Fill the funnel with topsoil. Now use a watering can to "rain" down on the funnel. Have students observe what happens. 3. Note all of the runoff that is now in the bottom of the jar. Tell students that their task, in groups, is to come up with ways to slow down and prevent the runoff.	livestock. According to the California Department of Food and Agriculture, our state produces nearly half of US-grown fruits, nuts and vegetables. Several crops enjoyed across the country are produced exclusively in California. Each sheet in this set introduces an agricultural commodity, plant nutrient or agricultural topic. Additionally, the sheets provide ideas for using this information in a lesson or activity. Additional commodity fact sheets are currently being prepared. If you need one that is not on the site you can contact sponsors. http://learnaboutag.org/resources/fact.cfm Teacher Resources http://www.choosemyplate.gov MyPlate illustrates the five food groups that are the building blocks for a healthy diet using a familiar image-a place setting for a meal. Before you eat, think about what goes on your plate, in your cup, or in your bowl. Science Projects, Farm and Food Fun, State Ag Facts, Ag Knowledge, Virtual Tours https://agclassroom.org/kids/tours.htm Download from website pages on each part of the plate. Click on each section on home page. The Journey of Milk https://www.youtube.com/watch?v=RWPhne-ThL0 Welcome to the Animal Improvement Programs Laboratory (AIPL) "Kid's Corner." Here you'll learn interesting and exciting facts about our lab, cows, and your favorite dairy	

		Have available for them to use: soil, grass clumps, leaves, pine needles, and rocks. 4. Have groups take turns demonstrating their findings and conclusions to the class. As a class, evaluate and discuss the success of various approaches. Point out that a common theme is that plant matter slows down the runoff and erosion of the soil. Draw analogies between this and how farmers plant buffer and/or cover crops and utilize no-till. **Exploring Further:** Explore your schoolyard for examples of erosion. Look for places where water has cut grooves into the soil or where small piles of sand have been deposited. Identify how the erosion was caused.	products. There are also lots of fun games you can play. http://www.aipl.arsusda.gov/kc/kcindex.html Click on Facts About Dairy Production http://learnaboutag.org/resources/fact/agwater.pdf info@learnaboutag.org Website: www.LearnAboutAg.org ©2014 California Foundation for Agriculture in the Classroom. farmwater.org http://farmwater.org/farm-water-news/water-used-to-grow-farm-products-doesnt-stay-on-the-farm-2/ Drought information sheet and video http://drought.unl.edu/DroughtforKids.aspx What's Really Happening on the Farm AGRICULTURE IN THE CLASSROOM www.agintheclass.org Limits of the Earth Virtual Tour https://agclassroom.org/kids/tours.htm Science Projects, Farm and Food Fun, State Ag Facts, Ag Knowledge, Virtual Tours Teacher Resources Grapevine Annual Cycle http://www.tablegrape.com/lifecycle.php http://www.tablegrape.com/history.php	

Determine Unit Key Vocabulary

Academic:

resource	bubble map
manipulating	funnel
culminating	sacramental
persuasive	fledgling
duration	yield
variable	uniformity

Domain specific:

agriculture	irrigation
San Joaquin Valley	ground cover
fertilizer	condensation
livestock	runoff
commodity	transpiration
crops	no-till
golden state	precipitation
consume	viticulture
nutritional needs	rain gauge
drought	Friars
poultry	rainfall
erosion	dormancy

Useful Websites:

- Agricultural Water Fact Sheet Economic Facts and the History of Agricultural Water Development in California http://learnaboutag.org/resources/fact/agwater.pdf
- California Agriculture Overview, https://agclassroom.org/teacher/stats/california.pdf
- California Produces map, www.cfaitc.org/caproduces
- Additional commodity fact sheets are currently being prepared. If you need one that is not on the site you can contact sponsors. http://learnaboutag.org/resources/fact.cfm
- Science Projects, Farm and Food Fun, State Ag Facts, Ag Knowledge, Virtual Tours, https://agclassroom.org/kids/tours.htm
- ChooseMyPlate, http://www.choosemyplate.gov
- The Journey of Milk, https://www.youtube.com/watch?v=RWPhne-ThL0
- Welcome to the Animal Improvement Programs Laboratory (AIPL) "Kid's Corner." Here you'll learn interesting and exciting facts about our lab, cows, and your favorite dairy products. There are also lots of fun games you can play. http://www.aipl.arsusda.gov/kc/kcindex.html
- Click on Facts About Dairy Production - Water as a farm resource, http://learnaboutag.org/resources/fact/agwater.pdf http://farmwater.org/farm-water-news/water-used-to-grow-farm-products-doesnt-stay-on-the-farm-2/
- Drought information sheet and video, http://drought.unl.edu/DroughtforKids.aspx
- What's Really Happening on the Farm - AGRICULTURE IN THE CLASSROOM
  Lessons about all areas of the farm, developed by the state of Virginia, www.agintheclass.org

Book List

The following books are available in the CSUF library.

Agriculture

Fisk, E.K.	Socio-Economic Problems of Urbanization
Parlin, Bradley	Farmer Participation: Irrigation
Kramer, Fritz	Tilling Tools
Netting, Robert	Farm Families

Beef/Diary

Rifkin, Jeremy	Rise: Fall of Cattle Culture
Friend, John	Cattle of the world
Diggins, Ronald	Beef Production
Ensminger, Eugene	Beef Cattle Science Handbook
Roy, J.H.B.	The Calf
Field, Michael J.	Factors Affecting Calf Crop
Grohman, Joann	Guide to Raising Cows
Ensminger, Eugene	Dairy Science Handbook
Bath, Donald	Dairy Cattle Practices, Profits
Acker, Duane	Animal Science: Industry
Bogart, Ralph	Improvement of Livestock

Sheep

Baker, Eustace	Care: Breeding of Sheep
Ensminger, Eugene	Sheep: Goat Handbook

Pigs/Hogs/Swine

Pond, Wilson	Swine Production
Ensminger, Eugene	Swine Science

Plants

Langer, R.H.M.	Agricultural Plants
Forbes, J.C.	Plants in Agriculture

For Reading Enjoyment: Clovis Library

Herriot, James	Every Living Thing
Herriot, James	All Things Bright and Beautiful
Herriot, James	All Things Wise and Wonderful

Teachers Resources

"The Big Fresno Fair History"

Over 100 years ago, in 1882, a group of prominent Fresnans took the lead and formed the Fresno Fairgrounds Association. Ranchers and growers of the San Joaquin Valley had long recognized the quality and variety of area products and livestock, and that recognition and pride resulted in the establishment of the Valley fair. One hundred acres were purchased in February, 1883 for $5,000 form land developer Thomas E. Hughes, later known as the "Father of Fresno." Nearly every fall since 1884 the Central San Joaquin Valley has come alive with a celebration of its agricultural harvest known as THE BIG FRESNO FAIR.

The first fair, beginning on October 7, 1884, ran five days and consisted mainly of a horse racing meet for trotters, a livestock department and few produce exhibits, including a 105 pound pumpkin from the Hughes Ranch. "Confidence", a three year old race horse was favored to win the opening day handicap, where a purse of $100 went to the winner. Many of Fresno's first families were in the grandstand, but some were elegant and preferred to view the proceedings from their carriages parked in the infield. Perhaps your great grandparents thrilled to the opening race at The Big Fresno Fair.

Managed by the Fresno Fairgrounds Association and its founding father, Dr. Lewis Leach, exhibits and events continued to multiply until 1893. Then the fair went through a period of change and uncertainty.

With the hiring of manager Clyde Eberhart in 1910, The Big Fresno Fair began to take hold as a tradition. In 1920 the Fresno Chamber of Commerce took over the fair's management and continued until 1931. The Fair floundered briefly at the time but was rescued by the Fresno County Junior Farm Bureau, a group of young men who secured a $300 loan and resurrected the Fair. They were responsible for many changes, such as clean fairgrounds and first-rate exhibits. Fair attendance grew by leaps and bounds. In the early thirties the practice of charging admission for exhibits and events inside their grounds was abolished and The Big Fresno Fair adopted a "One-Pay-Gate". This policy was so successful that soon most fairs throughout the nation adopted it. Today, at the Fresno Fair, Most entertainment and special events are still free once the fairgoer has paid the entrance gate admission.

World War II halted the fair for six years, from 1942 to 1947. The Fairgrounds first became a temporary holding facility for Japanese Americans interned by the U.S. Government, and later was a military base for processing new recruits.

In 1948 the Fair emerged reborn and continued to grow over the next quarter-century and today ranks as one of the largest fair in California. Located in what is now the world's agricultural capital, the Big Fresno Fair attracts over 650,000 attendees each year. You may call The Big Fresno Fair Office for any additional information, (559-650-FAIR).

History of Grapes

History 1: The California Tradition of Viticulture

For more than two centuries, Californians have been cultivating grapes. Viticulture, or the science, production and study of grapes, first began in California in the late 1700s when Spanish Friars arrived to establish Catholic missions. Because the native grapes were sour and made poor wine, the Friars brought over grapes from Europe and planted their own vineyards to make sacramental wine.
In the mid-1800s, prospectors poured into California. They came looking for gold until some discovered that there might be more money in grapes. Shortly after the Gold Rush, California's fledgling agricultural society declared, "Capital put into vineyards would bring greater rewards than fluming rivers for golden treasures." Their instincts were good. California's warm, dry climate turned out to be ideal for growing grapes. Today, more than 800,000 acres across California are planted with fresh grape, wine and raisin vineyards and 99% of U.S. commercially grown table grapes are from California.

6000 B.C.	Vitis vinifera grape (common grape vine) varieties are first cultivated near northern Iran between the Black and Caspian seas.
3000 B.C.	Cultivation reaches Egypt and Phoenicia.
2000 B.C.	Viticulture reaches Greece.
1000 B.C.	Viticulture reaches Italy, Sicily and North Africa.
500 B.C.	Viticulture reaches Spain, Portugal and France, then spreads across Europe to the British Isles.
1839	Kentucky-native William Wolfskill plants the first table grape vineyard in California.
Mid-1800s	Hungarian expatriate Colonel Agoston Haraszthy, often called the "Father of California Viticulture" brings 100,000 cuttings of Vitis vinifera varieties from Europe to California.
1860	English settler William Thompson plants a Mediterranean grape called the "Oval Kishmish" near Yuba City north of Sacramento. This popular green variety is now known as the Thompson Seedless.Thompson Seedless.
1869	Fresh table grapes are first shipped to eastern markets.
1970	Per capita consumption of grapes in the United States reaches 2.5 pounds.
Today	Per capita consumption of grapes in the United States hovers around 8 pounds.

History 2: Four Seasons in the Valleys of the Sun

The California table grape season begins in late spring when the first grapes are harvested in the Coachella Valley, California's southernmost growing region. By mid-July, Coachella's season has ended and harvest moves north to the San Joaquin Valley. Through late fall, the harvest of fresh grapes from California continues. Sequential harvesting from south to north combined with advanced storage techniques means that varieties of California table grapes are available from May to January.

History 3: The Life Cycle in the Vineyards

The winter months are an important part of the California table grape growing cycle. Growth and development stop temporarily and the vine rests. This stage is called "dormancy." At this time, growers prune the vine and set it up for the upcoming cycle to begin. Pruning and training of the vine are two of the most important aspects for quality grape production – growers decide how much and which parts of the previous season's growth to remove in order to regulate vegetative growth (shoots and leaves) and crop load (grape clusters) to produce quality grapes and optimum yield. In early spring tiny buds on the vine start to swell and green leaves appear. Appearance of the first green leaves through the bud scales is called budbreak. Growth is slow at first. As the mean temperature rises, growth and shoot elongation accelerate. After three or four weeks, the period of most rapid growth begins – where shoots can grow an average of one inch or more per day. As the days warm up, flowers bloom, then shatter to make way for the tiny green grapes that will eventually ripen into clusters. Berry size increases rapidly. Sunlight and warm temperatures are vital to the physiological functions of the grapevine (such as photosynthesis). The point in the growing season when ripening grapes begin to soften is called "veraison." During ripening, colored varieties gradually change color from green to either red or black, while

green varieties become translucent. Sugars start to accumulate in the berries. The interval from veraison to harvest is different for each variety. Unlike many fresh fruits, grapes are harvested fully ripe. After they're picked, they do not become sweeter, so timing is everything. Determining when grapes are ripe is a real science and both the U.S. Department of Agriculture and California Department of Food and Agriculture are involved in setting and monitoring grape production standards. Sugar content, color, bunch and berry size and uniformity are all measured before harvest begins and the workers who decide which grapes to clip are trained professionals with years of experience. Once picked, fresh grapes are easily damaged by rough handling, warm temperatures, excessive moisture and decay-causing organisms. Consequently, grape bunches are carefully inspected and then immediately packed by hand into shipping containers -- sometimes right in the field. Shortly after picking, the field heat is removed from the fruit in cold storage facilities. From this point until they reach their destination -- markets throughout the world -- the grapes will be maintained in a carefully regulated environment to assure they arrive in just-picked condition.

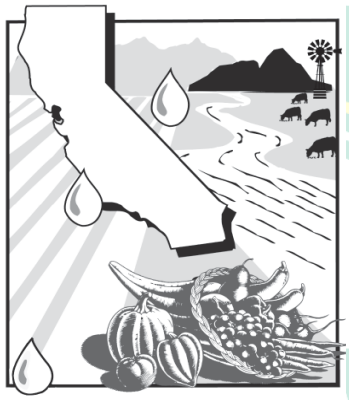
See website (http://www.tablegrape.com/history.php) for:
History of Agricultural Water Development in California
Lesson ideas
Fantastic Facts

Natural Resource Fact Sheet

Agricultural Water

Information compiled by the California Farm Water Coalition

Sources – California's water supply averages 194.7 million acre-feet per year, statewide. This water comes from rain and snowfall and the Colorado and Klamath rivers. From this supply, the majority is consumed by natural vegetation, leaving 82 million acre-feet available for dedicated use. During an average water-supply year, California farmers and ranchers consume 33.1 million acre-feet of water to grow their crops. Other consumptive uses include the environment at 38.7 million acre-feet and 8.0 million acre-feet for municipal and industrial uses.



The major projects that have been the primary sources of stored water include the Central Valley Project (CVP), State Water Project (SWP), Coachella Canal, All-American Canal, and the Klamath Basin. Construction of the CVP began in 1937 and for the SWP in 1957, with full SWP funding approved in 1960. The delivery of water origininating in northern California from the CVP and SWP has been reduced in recent years due to enviromental regulations that govern the delivery of water through the Sacramento-San Joaquin Delta.

Distribution – Water is available through natural precipitation such as rain and snow. It is then transported throughout the state's numerous waterways, including creeks, streams, lakes, and rivers. Other water is stored underground in porous rock and soil (also called aquifers) and brought to the surface by wells and pumps. Approximately 30 percent of the water supply for farms, homes and businesses comes from groundwater.

Two-thirds of the demand for water comes from the Southern one-third of the state while two-thirds of the precipitation and water storage are in the Northern one-third, creating significant challenges for water distribution.

History – The history of California agriculture and water development are intertwined. The first California agricultural water delivery system was built at Mission San Diego Acala. With the Gold Rush, the state's demand for food grew with its population. As early as 1865, private companies began constructing canals in the Central Valley to irrigate crops. In 1877, the State Legislature passed the Wright Act, authorizing the formation of public irrigation districts. These agencies, formed by local citizens, are responsible for providing a steady, reliable supply of water for irrigation, flood control, recreation, human consumption, and other uses. In the twentieth century, the California Department of Water Resources and the United States Bureau of Reclamation also began storing water and delivering it to farms and cities. This large-scale development of water has allowed California to become a national and world leader in agriculture.

Irrigation Techniques – Simply stated, the term "irrigation" is the process of putting water into the soil to make plants grow. There are three basic ways to irrigate: surface, micro-irrigation, and sprinkler. Surface irrigation includes methods such as border-strip and furrow where water flows on top of the soil. Micro-irrigation techniques, such as drip, bubbler, spray, and subsurface drip, deliver a measured amount of water through an emitter located near each plant. Micro-irrigation techniques can be located above or below ground. Sprinkler irrigation includes the use of a mechanical device which sprinkles water over the crops and simulates rain.

The method of irrigation used depends on many factors including geographical location, crop type, soil type, climate, and economics. Farmers often use laser-leveling to make their fields level or sloped for efficient irrigation.

Economic Value – Water is an essential component to life and the economy of California. It is vital to the success of California's $44.7 billion agricultural industry. California has led the nation in farm production every year since 1946. Each of the more than 400 crops grown in California depends upon the availability of water—from the fruits, vegetables and meats people eat to the cotton and wool clothing people wear and the forest and floral products people use and enjoy.

For additional information:

California Farm Water Coalition
6133 Freeport Boulevard, Second Floor
Sacramento, CA 95822
(916) 391-5030
Fax: (916) 391-5044
Email: info@farmwater.org
Website: www.farmwater.org

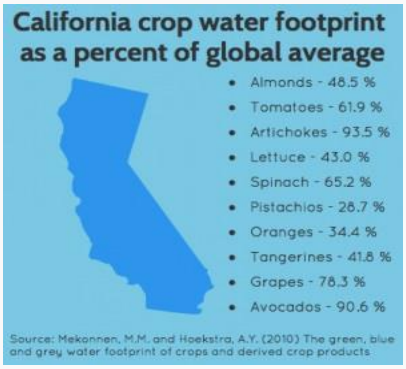
California Farm Water Coalition

09/14

farmwater.org http://farmwater.org/learn-more/drought/are-we-really-using-too-much-water-to-grow-food-in-california/

It takes water to grow food

Are we really using too much water to grow food in California? The simple fact is that it takes water to grow food no matter where in the world you till the soil. Critics claim that the consumption of California farm products is somehow contributing to the drought. That is an unwise assertion and here's why.



California grows more food using less water

California produces about half of the nation's fresh fruits, nuts and vegetables and does it more efficiently and responsibly. They're the kinds of foods that nutritionists say we should be eating as part of a healthy lifestyle. Consumers want choices and California's 400 different commodities gives them exactly that. California also produces food products more efficiently than anywhere else in the U.S. and more specifically the world. California is one of only five Mediterranean climates on earth and the only one in the United States. Growing what we grow here simply isn't possible in most other places.

California is the natural place to grow food

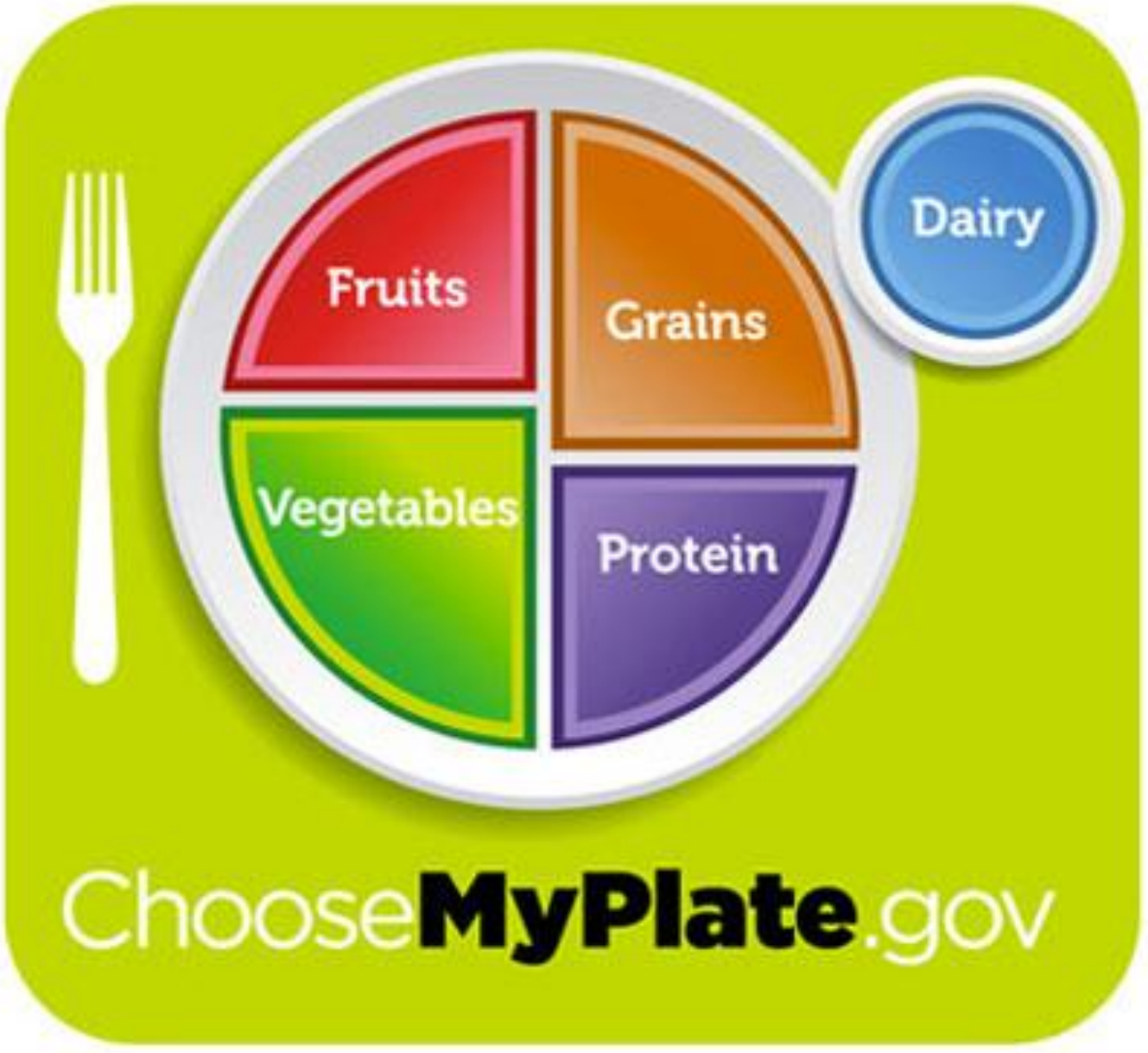
Factors such as wet winters and dry summers, soil characteristics and the right number of days with the right number of frost-free temperatures that make California the food producer that it is. Massachusetts, for example, will never be able to compete with California in terms of food production. And no amount of genetic engineering will be able to sufficiently get around the climate and soil type advantage that California enjoys.

Finding other states to replace California farm production isn't practical and importing more of our food supply from other countries has its own share of risks and problems. California already imports twice as much "virtual water" in the products consumed here than is exported in the things we produce. Increasing the amount of food imported from other countries contributes to this imbalance.

California is the efficient place to grow food

What we should focus on is growing food in places where it can be produced as efficiently as possible. Artichokes, lettuce, spinach and many other vegetables are produced year-round thanks to seasonal differences from the Imperial and Coachella valleys in the south through the San Joaquin and Salinas valleys northward. The Sacramento Valley grows all of the sushi rice produced in the U.S. An amazing 85 percent of the U.S.-produced fresh citrus comes from California. Tree fruits and nuts that require cold winters and hot summers grow better in California than anywhere else as well. It simply makes more sense to grow food where it can be produced efficiently and transport it to consumers where they live. The alternative is to struggle to grow food on the wrong soils or in the wrong climate where production efficiencies are lower and water, labor and pest control inputs are higher.

The solution proposed by California's farm critics- that we look elsewhere for our food supply- would mean that millions of consumers have fewer selections, lower quality and higher prices for the kinds of healthy choices they want for their families.


Fruits
Grains
Dairy
Vegetables
Protein
ChooseMyPlate.gov

Livestock Byproducts

1. **Bone**
   Bone China, crochet needles, dice, teething rings, glue, tools, high grade steel, refining sugar, bone meal, gelatin, weapons, cardboard, capsules, feed and fertilizer.
2. **Horn and Bones**
   Buttons and carving -set handles.
3. **Gelatin (from bone)**
   For making marshmallows, photographic fi lm, cigarette paper, painting rollers.
4. **Hides**
   All kinds of leather goods, such as clothes, sporting goods, (mitts, foot balls), shoes, purses and furniture.
5. **Body Chemicals**
   Detergents, pesticides, foam for use at airport runways, industrial oils, drum heads and tire lubrication.
6. **Fats**
   Manufacture of food items including, oleomargarine, chewing gun, candles and ice cream. For making soaps, animal feeds, pet food, lubricants, candles, fertilizer, balloons, garden hose, galvanized steel, medications, plastics, tin cans, explosives and cosmetics.
7. **Blood**
   Cancer research, culture media, animal feeds, pet food, shoe polish, adhesives, asphalt and cork.
8. **Glands**
   Are used in the manufacture of numerous pharmaceutical preparations, such as insulin, ACTH, Adrenalin and Vitamins. Thyroid tablets and hormones. Thrombin and bone marrow concentrates used in the treatment of various blood disorders.
9. **Other Byproducts**Musical instruments, violin strings, mood rings, tennis rackets, insulation, linoleum, welder casings, yogurt crayons, fabric dye, matches and paint.

Courtesy of Billie Hart, "The Fifth Quarter". See her exhibits in the world of Pigmania and Livestock Welfare

Contribution of Cattle to Modern Medicine

Today, scientists and chemists feel they have only scratched the surface in the development of useful things from the meat animal in addition to food. Although all animals play an equal role in producing life-bene fitting products used for the health and well-being of man's existence, each speckle does contribute some products derived from them exclusively.

A recent introduction to the medical field is the pericardia/ valve, which hand is made from the tissue that holds the heart of cattle together. The valve is used as a replacement of faulty valves in the human heart.

Insulin from cattle is also a major by-product. It takes pancreas glands from about 60,000 cattle to make one pound of pure dry insulin or 1500 pancreas glands to make one ounce of insulin.

Blood from an unborn calf is used in CANCER RESEARCH and Culture media.

Glands are used in the manufacture of numerous pharmaceutical such as: hormone ACTH, TSH, Adrenalin, Heparin, Thrombin and Thyroid tablets); vitamins; enzymes (Epinephrine, Trypsin, and Alpha Chymar (beneficial in cataract operations).

Bone marrow concentrations are used in the treatment of various blood disorders. Bone meal is a prominent source of calcium and phosphorus.

Bovine lung surfactant; a material taken from the lungs of cows and used to coat the lungs of premature infants, allowing the lungs to expand and contract with greater ease.

Inedible byproducts from cattle include glycerin (medications), surgical sutures, surgical gloves, salves and ointments. Fat from cattle is preferred over other animals for use in manufacturing photographic film and X-rays. Collagen-based adhesives-bandages.

Pharmaceutical Byproducts

Amfetin (amniotic fluid)
Arteries, Carotid (transplants)
Brain (checks bleeding)
Bile (cortisone, bile salts, frozen feet, hands, remove dirt, grease, dissolves gallstones)
Chymotrypsin (digestion, eye disorder)
Corpora Lutea (estrogen, progesterone, dysmenorrhea)
Enterogastrone (ulcers)
Hemoglobin (natural iron)
Hypothalamus (hormones)
Parathyroids (tetany, muscular contraction, nerve stimulation, kidney and other body functions)
Pineal Gland (treatment of children to stimulate physical & mental development)
Placenta or Uterine Cotyledon (start flow of milk when it fails in childbirth)
Spleen Extract (typhoid, malaria, anemia)
Trypsin (digestion of dead tissue from wounds and to speed healing from surgery)
Vitamin B-12 (treatment of anemia)

Courtesy of Billie Hart, "The Fifth Quarter": See her exhibits in the World of Pigmania and Livestock Welfare.

Contribution of Sheep to Modern Medicine

Today, scientists and chemists feel they have only scratched the surface in the development of useful things from the meat animal in addition to food. Although all animals play an equal role in producing life-bene fitting products used for the health and well-being of men's existence, each speckle does contribute some products derived from them exclusively.

Intestines from sheep are used to produce surgical sutures. These are much stronger and can be processed to the dimension of a hair. The Plastic Surgeon prefers this suture as it will not leave any scarring.

Cartilage and tendons are being kept from slaughtered sheep in hopes that in the future they will be able to implant them into the knees and hips of humans.

Inedible byproducts from sheep include violin strings, tennis racquets, Kazoo instrument, clothing, rugs, mood rings, thermometers, 3-D movie glasses, electrical circuitry, Masonic aprons, expensive fish bait, detergents, cosmetics, soap, glue, lotions, book bindings, hat sweat bands, shoe linings, globes, chamois skins, woolen cloth, fiber lubricants, leather dressing, contraceptive sheaths, pet food, trotters-gelatin and tanner's bait.

Pharmaceutical Byproducts

Adrenalin (treat shock & heart patients)
Arteries (transplants)
Enzymes
Lanolin (used in medicines)
Pituitary Extract (control human growth, safe childbirth)
Ointments
Ovarian Extract (estrogen, etc.)
Salves
Somatostatin (still under research, when taken with insulin it may prevent complications that insulin can't prevent in diabetics)
Surgical Ligatures, Sutures (stitches)
Thyroxin (thyroid problems)
Vitamins

Courtesy of Billie Hart, "The Fifth Quarter": See her exhibits in the World of Pigmania and livestock

Contributions of Swine to Modern Medicine

Today, scientists and chemists feel they have only scratched the surface in the development of useful things from the meat animal in addition to food. Although all animals play an equal role in producing life-bene fitting products used for the health and well-being of men's existence, each speckle does contribute some products derived from them exclusively.

Swine are particularly emphasized because of the many life-saving drugs and products derived from these animals. From swine we get heparin, an anti-blood coagulant and swine thyroid is preferred over sheep and cattle because of the higher count of iodine for thyroid medication. Insulin from swine is the
nearest to humans.

Surgeons have also discovered that swine heart valves are far superior than artificial valves for the use in human hearts.

Swine are the most similar to human anatomy so they are a must in medical research.

Inedible by-products from swine include glass, water filters, plastics and filtering agents.

Pharmaceutical Byproducts

ADH (antidiuretic, influences blood pressure)
Blood Fibrin (blood clotting)
Chenodeoxycholic Acid (dissolves gallstones)
Cholesterol (synthesis of steroid hormones)
Chymotrypsin (digestion, eye disease)
Corticosteroids (metabolism)
Cortisone (arthritis, eye disease and allergic disorders)
Entergastrone (fat digestion)
Enzyme (Pepsin) (used for indigestion, is in Pepto Bismol, chewing gum, used to clarify beer, wines, fruit juice & vinegar)
Epinephrine (regulates blood pressure and blood sugar levels)
Estrogens (female hormone)
Fetal Pig Plasma (hemophilia)
Gelatin (coating for pills and capsules)
Glucagon (sugar reserve)
Intrinsic Factor (to utilize vitamin B 12 & for pernicious anemia)
Lipase (fat synthesis)
Mucin (peptic and duodenal ulcers, lubricate food movement through the digestive tract)
Noreehinephrine (cardiac arrest and hypotension)
Oxytocin Hormone (treats obstetrical complications)
Pink Mucous Lining (used in achylia gastrica & stomach cancer)
Pituitary (control human growth, safe child birth)
Porcine Dressing for Severe Burns (skins of swine also make edible and inedible gelatin)
Progesterone (pregnancy hormone)
Prolactin (stimulates milk secretion, may play role in aid for breast cancer)
Pyloric Lining (to utilize vitamin B-12)
Relaxin (treats premature labor)
Secretin (digestion)
Splenin Fluid (typhoid, malaria)
Stomach (lining contain proteins, enzymes, digestive aids)
TSH (to locate small particles of thyroid cancer which have spread to other parts of body)
Thyroxin (metabolism and treatment hypothroldism)
Trypsin (digestion, wounds & burns)

Courtesy of Billie Hart, "The Fifth Quarter". See her exhibits in the World of Pigmania and Livestock

Animal Facts

Goats

1. Buck - Is a male goat
2. Doe - Is a female goat
3. Wether - Altered male goat
4. Kid - A goat under the age of 6 months
5. Kidding - Giving birth to their young
6. Udder - Milk gland, where their milk comes from
7. Gestation - Five months

The goat is part of a very large family of animals called "RUMINANTS". The special name that they have is due to the makeup of their stomach. Animals in this class are very different than any other animal. They have four stomachs and have no teeth on the upper jaw. Many times as you walk through the barns you will see these animals chewing their "Cud".
The "Cud" is re-chewing of food. If you did not know what they were doing you may mistake them for chewing gum. The reason that they have to re-chew their food is because of the special stomach. These animals spend most of their time chewing their food so that it can easily be digested.

The pigmy goat is only 18-20 inches tall. They also have one other very special feature, and that is that they only come in four colors. The colors are: Gray, Black, Cream and Agouti. So as you walk through please look for these special critters.
There are 6 breeds of goats:

1. Alpine – Can be any color with erect ears.
2. Togenburg – Brown with white stripes on the face and erect ears.
3. Oberhasli – Red brown with black stripes on the face and erect ears.
4. Saanin – White only, no other colors allowed with erect ears.
5. Niobean – Any color with long pendulous ears with a roman nose.
6. Lamancha - Any color with very short ears, there are two types of ears, the very, very short ears are called “gopher” ears and the longer ones are called “cookie” ears. This is the only breed developed in the United States.

We have Alpines, Lamanchas, Nubians, Togenburgs, and Saanins in the barn. Most births are usually twin or triplets. Though singles and quadruplets are common. This is called a litter. Goats give milk for human consumption and to make cheese, ice cream, and yogurt to name a few things. Kids weight about 5 pounds at birth.

Sheep

1. Ram – Is a male sheep
2. Ewe – Is a female sheep
3. Lamb – Is a young sheep of either sex
4. Wether – Is an altered male
5. Sheep are raised for both meat and wool.
6. We shear sheep to harvest the wool. This is done once a year.
7. Gestation period is four months.
8. Twins and single births are normal. Triplets are less common.
9. When a ewe has a baby we call that lambing.
10. Sheep are born with long tails which are sometimes docked before they develop any nerves.
11. White face breeds are usually wool breeds. Black face breeds are usually used for meat.
12. Sheep are ruminants having 4 stomachs and chew a cud.
13. A cud is food which is being chewed a second time after being held in the first stomach.
14. Wool breeds are: Rambouliet, Cheviot, Dorset, and Columbia. Sheep usually considered meat breeds but which do produce a fine grade of wood are Corriedale, Suffolk, Southdown and Hampshire.

Swine

1. Swine – Also referred to as pigs or hogs
2. Herd – A group of swine
3. Boar – Is a male hog
4. Sow – Is a female hog
5. Pig – Is a very young pig, either sex
6. Gilts – Young female animals
7. Barrow – Altered male
8. Used for meat, such as bacon, ham, sausage
9. Hogs come in many different colors: all white, all red, all black, black with one or two white front legs plus a belt of white, and white with black or red spots
10. Pigs are shown with a cane and loose in the ring
11. The notches in some of the ears designate what farmer they belong to
12. Gestation period is three months, three weeks
13. A pig usually weighs about two pounds at birth
14. 10-12 in each litter
15. When a sow gives birth we call that farrowing
16. Pigs are one of the cleanest animals in the barn
17. Pigs have a simple stomach, like man, and eat bakery waste (bread, rolls, etc.), barley, beans, carrots, beets, turnips, oats, peanuts, potatoes, rice, sunflower seeds, heat, and some ground alfalfa.

Cattle

1. Bull - Is a male, any age
2. Cow - Is a female which has had a calf
3. Calf - Is a male or female less than six months of age
4. Steer - A castrated male (removal of testes)
5. Heifer - A female which has not yet given birth to an offspring
6. Cattle are raised primarily for meat and milk.
7. Gestation period is nine months.
8. Single births are the norm, but the birth of twins occurs occasionally.
9. When a cow has a calf it is called calving.
10. Bull calves are usually castrated unless kept for future breeding purposes.
11. Major breeds such as Hereford, Angus, Shorthorn, Brahman and Charolais are often crossbred, as well as lesser known breeds.
12. Cattle are ruminants and chew a cud.
13. A cud is food which is chewed a second time after being held in the first stomach.

The following is a partial list of the more common known beef breeds: Hereford, Angus, Charolais, Brahman, Gelviah, Beefmaster, Simmental and Shorthorn.

Dairy breeds: Holstein, Guernsey and Jersey are the most common in this area, but there are many other breeds raised here.

Examples of the many and varied uses of beef

1. Candle
2. Cellophane
3. Ceramics
4. Cosmetics
5. Crayons
6. Deodorants
7. Detergents
8. Insecticides
9. Insulation
10. Linoleum
11. Perfumes
12. Paints
13. Plastics
14. Shoe cream
15. Shaving cream
16. Soaps
17. Textiles
18. Pet foods
19. Floor wax
20. Horse & livestock feeds
21. Leather sporting goods
22. Luggage
23. Boots & shoes
24. Bandages
25. Wallpaper
26. Sheetrock
27. Emery boards
28. Glues
29. Artist's paint brushes
30. Photographic film
31. Combs
32. Imitation ivory
33. Piano Keys

Beef byproducts for mechanical types of uses

1. Hydraulic brake fluid
2. Airplane lubricants and runway foam
3. Various machine oils and viscous fluids
4. Steel ball bearings containing bone charcoal
5. Car polishes and waxes
6. Textiles for car upholstery

Pharmaceutical uses of beef

1. Insulin – For diabetes
2. Pancreatic – Aids digestion
3. Glucagon – Treats hypoglycemia
4. Tyrosine and Chymotrypsin – For burns and wounds
5. Bone Marrow – For blood disorders
6. Soft Cartilage – For plastic surgery
7. Bone Meal – Calcium and phosphorus source
8. Blood Plasma – For hemophilia and kills some viruses
9. Blood Albumin – RH factor types
10. Trombin – Blood coagulant
11. Iron – For anemia
12. Intestines – Medical sutures
13. Prolactin – Promotes lactation
14. Pressor Hormone – Regulates blood pressure
15. Vasopressin – Controls intestinal and renal f unction
16. ACTH – For arthritis and allergies
17. Heparin – Anti-coagulant
18. Liver Extract – Treatment of anemia
19. Vitamin B-12 – Prevention of B-complex deficiencies

99% of every beef animal is used for beef and byproducts

Rabbit

Many of us think of Peter Cottontail when we see a rabbit but the Cottontail is only one breed in the rabbit world. They range in sizes from large to small. Rabbits are used for many things, their meat as well as their fur.

1. Buck – Is a male rabbit
2. Doe – Is a female rabbit
3. Junior – Is a young rabbit under 6 months
4. Intermediate – Is a rabbit at the age of 6-8 months
5. Senior – Is a rabbit older than 6 months
6. Fryer – Is used f or meat 10 weeks of age

Poultry

As we move through this barn we will discover there are many different kind of chickens. The reason there are so many chickens is because they have so many uses in the Poultry World. Poultry is the name that is given to the chickens in the industrial world. Here are some facts about our feathered friends.

Chicken

Poultry uses are as follows: egg production, meat production, feather and organic matter.

1. Cock – Is a male over one year
2. Hen – Is a female over one year
3. Cockerel – Is a male one year or younger
4. Pullet – Is a female one year or younger
5. Rooster – Farm term for all male chickens
6. Fryer – 3 ¼ to 5 pounds not to exceed 10 weeks

Pigeons

Many pigeons that you see in the barn also have very specific uses. Many of their uses are explained by their name. The unique homing ability of the Homing Pigeon explains why it is called the Homing Pigeon. The Tumbler is given this name due to the way it flies. This bird rolls from the sky. Keep in mind there are more varieties of pigeons in our barn. Make sure you keep a close eye out for these breeds.

Turkey

1. Tom – Is a male turkey from the time of hatching
2. Hen – Is a female turkey from the time of hatching
3. Poults – Is a baby turkey

Other Foul

1. Water Foul (ducks and geese)
2. Wild Foul (pheasants, doves and quail)

Myths & Facts about Beef Production

1. **Food Resources**

Myth: By "eating lower on the food chain" (eating less meat), Americans would improve the environment, and they would free land and other resources for production of food crops rather than meat and other animal products.

Fact: The optimum use of natural resources in the U.S. as well as other parts of the world involves use of both animals and plants to produce the nutrients which humans require. For example, about half the land area of the U.S. is strictly grazing land-not suitable for crop production. That land would be of no use as a food resource if it were not for grazing livestock.

Background: Cattle are more "environmentally friendly" and more efficient in their use of land, grain, water and energy than sometimes is claimed. (Also see Myths and Facts on soil and land conditions, grain feeding, energy consumption, water use, and deforestation.) Only through ruminant (four stomach), grazing animals can we harvest food from the more than one billion acres of range and pasture land in the U.S. At least 85% of the grazing land is too high, too rough, too dry or too wet to grow cultivated crops. The availability of grazing cattle most than doubles the U.S. land area and can be used to produce plants for food purposes.

Cattle production is not preventing production of plant-source foods for domestic and overseas use. The U.S. has more than enough cropland to grow both feed grains and food crops. In fact, because of grain surpluses, government crop programs involve removal of land from grain production.

Cattle are fed just enough grain, in feedlots, to make beef production highly efficient and to make beef more affordable. Grain feeding makes beef more palatable. Feedlot feeding helps even out the beef supply, avoiding the seasonal gluts and shortages to spend more times on grass, the size of the cattle herd would have to be reduced, beef supplies would be smaller, and costs would be higher.

Actually, the nutrient values of plant and animal-source foods cannot be directly compared. Livestock serve as a means of gathering, concentrating and storing nutrients essential to human health. In the U.S., foods from animals supply 68% of the protein, 35% of the energy, 83% of the calcium, 60% of the phosphorus, 42% of the iron, 89% of the vitamin B-12 and large amounts of other essential nutrients.

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2. **Soil and Land Conditions**

Myth: Livestock raising in the U.S. is largely responsible for loss of topsoil. Overgrazing is causing deterioration of western rangeland.

Fact: Cattle production is not a major factor in U.S. soil erosion. In fact, production of forage (as opposed to cultivated crops) and use of grazing animals to produce food from the forage are one way to conserve soil. For more than 50 years, steps-including managed livestock grazing-have been taken to improve range conditions. Experts agree that the rangelands, including publicly owned rangelands in the West, are in better conditions than they have been since the turn of the century.

Background: Most of the nation's crop land is used to produce crops for human food use and for export. Only 19'Yo of total cropland is used to produce feed grains. It is estimated that production of grains and harvested forages for all beef cattle accounts for only 5.8% of soil erosion from non-federal rural land. However, soil erosion is a possible problem in producing of any crops. That is why cattle producers as well as other farmers and ranchers are now involved in soil conservation programs. Use of conservation tillage practices continues to grow. Grass is used as a protective cover for soil.

Western range conditions suffered in the early 1900's because of drought and over-grazing. Since then, livestock producers, range scientists and federal land managers have worked to improve conditions. In a recent report, the Bureau of Land Management pointed out that public rangelands were in better condition than at any time in this century.

The trend on more than 87% of BLM rangeland is stable to improving. Managed grazing results in better grass conditions than would exist if were no grazing. The grazing improves vegetation health and diversity - it's similar to mowing a lawn.

In a recent survey of cattle producers, 52% of producers said that the condition of their pasture or range had improved since 1980 - because of various management practices. Only 13% said that conditions had declined, and that was because of drought.

Whether land is public or private, it is in a cattleman's own best interest to promote regeneration of forages and to take proper care of the resources for which he is responsible. Grazing management is the main job of a producer with pasture or range. A producer must be a good steward of the land if he is to be successful and if he is to pass his business on to the next generation.

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3. **Cattle Feeding**

Myth: Cattle consume excessive amounts of grain - grain that otherwise could help feed hungry people.
Fact: 1) An average of 4.5lbs. of grain (compared to a claimed 16lbs.) is used in producing a pound of beef (retail weight). 2) The world hunger problem is a result of poverty, lack of buying power and food distributing problems - not meat eating in the U.S. The grain whose use is debated would not even be produced unless there was a market for it. To get more grain to the poor and hungry, taxpayers or other organizations must buy it and distribute it.
Background: Beef cattle spend all or most of their lives on pasture and range. At least 80-85% of the nutrients consumed by cattle come from non-grain sources feedstuffs not edible by humans. These feedstufffs include grass, roughage, food processing by-products and crop aftermath.

Less than half the dry matter produced by crops is edible by humans. Millions of tons of nutrients would by wasted - to say nothing of waste disposal problems - if it weren't for the fact that livestock can make use of food processing by-products and crop residues like corn stalks.

Grain feeding has made possible a larger, more economical supply of livestock and poultry products in the U.S. The amount of grain consumed by beef cattle is about the same as that consumed by hogs and somewhat less than consumed by poultry. Most of the grain fed to cattle is feed grain, not food grain like wheat and rice.

The U.S. continues to process more grain than can readily be sold. For most of the last three decades, U.S. grain surpluses have increased, even with an expanding animal agriculture. That is why acreage reduction has been part of government grain programs. The increase in grain supplies has not helped alleviate world hunger. If grain were not fed to livestock, more grain would not necessarily be available to feed the hungry. Relief programs and/or economic development in poor countries, providing the ability to produce or purchase and distribute more food, are needed to help solve hunger problems.

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Grain Utilization in Livestock and Poultry Industries, Cattle-Fax, December, 1989.
Grain Consuming Animal Units, USDA, January, 1990.

4. **Energy Use**

Myth: Livestock and meat production accounts for an excessive amount of fossil fuel use, which will lead to depletion of our petroleum reserves much more rapidly than would by the case if we ate only plant-source foods.
Facts: U.S. agricultural production accounts for only 2.5% of total fossil fuel energy used in the U.S. Beef production accounts for less than 0.5% of energy use. More than 80% of the total energy involved in food production, processing and preparation is used after food leaves the farm. Because many plant-source foods require large amounts of energy in the processing phase, the over-all energy efficiency of beef often is comparable, or even superior, to the energy efficiency of plant-source foods.
Background: Most of the energy used to produce cattle is solar energy - the solar energy used in growing grasses and forage as well as feed crops. Grazing alone supplies 5% to of feed energy used in producing beef cattle. The fossil fuel energy used to produce 70 lbs. Of beef (retail weight), the average annual per capita consumption, is equivalent to 12-25 gallons of gasoline per year, or only about 1/15 of a gallon for 4 oz. of beef-one serving.
Mechanization of agriculture, through use of fossil fuels, is a major reason for the higher standard of living in the U.S. Millions of people have been freed from having to live on farms and grow food for themselves and possibly a few others. Those people now produce other goods and services, thus raising the overall standard of living. Also, substitution of energy for land (through

mechanization and more intensive farming of productive land) has released much of the poorer, more erodible land for grazing and forage production for cattle.

Foods must be compared in the forms consumed and not as raw products. People eat virtually no unprocessed grain, for example. On the basis of foods as eaten, beef compares favorably with many other foods in terms of energy use. Also, many people now select foods on the basis of fewer calories, not just calories or energy. Beef supplies large amounts of essential nutrients-including vitamins, minerals and protein-in relation to the calories or energy per serving.

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Ruminants as Producers of Human Food, J.R. Carlson, Washington State University, 1989.

5. **Water Use**

Myth: It takes 2,500 gallons of water to produce a pound of meat.
Fact: The total amount of water used in on-farm production of grain-fed beef average is lower. That is because more than 30% of all beef is from cattle consuming little or no grain (some of which may be irrigated). Water for cattle production is not "used up". It is quickly recycled as part of nature's hydrological cycle.
Background: The claim that 2,500 gallons of water are used to produce a pound of beef has to be based on incorrect feeding and crop irrigation assumptions. Data on livestock drinking water use and on hay and grain crop irrigation indicate that water use for beef production is significantly less than claimed. That is true even if one assumes that most of the grain fed to cattle is from irrigated crop land (because of more feeding and more grain crop irrigation in the arid West).

Mature cattle consume 8 to 15 gallons of water per day, depending on temperature, humidity and type of feed consumed. Most of this water returns to the soil. Most water used in beef production is for irrigation of hay, silage and grain in arid regions. Total use of water to produce an 1100lb. Grain-fed slaughter animal, with 682 lbs. of carcass beef, is estimated at 200 gallons per pound of carcass beef. The average for all beef is significantly less because more than a third of U.S. beef is f cattle getting little or no grain.

The average citizen in Fort Collins, Colorado, uses 81,450 gallons of water for drinking, waste disposal, bathing, laundry, lawn watering, etc. in a year's time.

Water used in cattle production is not "consumed" or "used up". For example, water put on cropland mostly evaporates or runs off and appears as rain or in stream water in lactation in the hydrological cycle. Water taken up by plants leaves the plants through transpiration and evaporation and returns to the earth as rain, recycling many times during a growing season. Most of the water "used" in cattle production is quickly recycled. Most of the water used by humans goes into sewage systems and into streams and oceans before being recycled.

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A Perspective on Beef as a Component in Diets for Americans, Texas A&M University, 1990.

6. **Deforestation**

Myth: U.S. beef consumption is causing deforestation of land in the U.S. and destruction of tropical rainforests in Latin America.
Fact: There is no evidence that livestock grazing has been a significant factor in deforestation of U.S. land. And there is little or no relationship between U.S. beef (for hamburger or any other use) from Brazil or other South American countries. Imports of beef from Central America amount to only 0.4% of beef used in the U.S.
Background: An examination of available information shows that conversion of forest to other uses in the U.S. is much less than claimed and that livestock production is not a significant factor. Scientific literature indicates that livestock grazing is responsible for less than 6% of the conversion of forest to other uses in the U.S.
There is no shortage of land in the U.S. for production of crops of various types. In fact, because of grain surpluses, the government has encouraged removal of land from crop production. There is no pressure to convert woodlands to agricultural use. Grazing is practiced on some deforested land in Latin America, but the primary causes of excessive rainforest destruction are not related to beef production. Most of the forest land conversion has been for crop and timber production. The U.S. imports no fresh beef from South America. Because of animal health regulations, the U.S. permits importation of only cooked

and canned beef (and the amount is limited) from South America. Recently, because of meat inspection problems in Brazil, USDA banned imports of even canned beef from Brazil. Imports represent only a small part of U.S. beef consumption. Only 0.4t'o of beef used in the U.S. comes from Central America. Avoiding U.S. fast food hamburgers or other beef will do nothing to halt rainforest destruction.

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7. **Methane Production**

Myth: U.S. cattle produce large amounts of methane, a "greenhouse" gas, thereby contributing significantly to possible global warming problems.

Fact: Methane represents only 18% of the world's greenhouse gases, and only 7% of world methane production is attributable to cattle. Beef cattle in the U.S. account for only 0.5% of world methane production and only 0.1% of total greenhouse gases. Because of highly efficient production methods, U.S. beef cattle emit much less methane per animal unit than do cattle in other countries.

Background: It has been said that the world's 1.3 billion cattle produce almost 100 million tons of methane a year. However, cattle's contribution to the possible methane and greenhouse gas problem is less than sometimes stated. An analysis shows that, because of the carbon dioxide produced, driving six miles each way to buy a hamburger would result in 100 times as much greenhouse gas as the methane generated in producing a hamburger in the U.S. Controlling methane emissions from cattle, even if it could be done, would provide little or no benefit from the point of view of global atmospheric biomass burning, fossil fuel exploration, landfills and coal mines.

If efforts were made to reduce cattle's methane production throughout the world, the best approach would be to follow production systems in the U.S. Modern technology, including products and programs to improve feed conversion, reduces methane production and improves animals' use of feed energy. U.S. cattle go to market at younger ages. All of this means that U.S. cattle contribute relatively much less to any possible global warning effect than do cattle in other countries.

Concern about methane emissions from cattle often is based on projected increases in world cattle numbers. These assumptions overlook the fact that the U.S. cattle herd has decreased in size and is expected to remain stable. Because of the efficiency of U.S. production methods, the industry is producing more beef per animal unit than in past years.

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8. **Waste Management**

Myth: Cattle produce large amounts of manure, and much of the animal waste winds up in the U.S. water supply.

Fact: Manure production by all livestock and poultry is only a fraction of that claimed by critics. Essentially all livestock and poultry manure winds up as a natural fertilizer on the land-on range and pasture land or on crop land - and it is recycled without polluting water supplies.

Background: At least 60% of cattle manure, like that from wildlife, is deposited on the hundreds of millions of acres of pasture and open range and forest land, and it presents no pollution problem. In fact, animal droppings are important in maintaining water and mineral cycles in native range land. Essentially all beef cattle manure in feedlots is collected, loaded, hauled and applied as a natural fertilizer to soil directly or via storage/treatment systems. Tests show that groundwater quality in leading cattle feeding regions remains good. Environmental Protection Agency data show that any water quality impairment of streams and rivers from all types of agricultural operations, including sediment from cropland, is less than 10% of the U.S. total of almost 1 million miles of streams.

Management of feedlot surfaces, use of storage lagoons and holding ponds, and other management practices have helped prevent run off and groundwater contamination problems. There also are recommended practices for spreading manure and waste water on agricultural land. Since 1974, EPA has had regulations prohibiting discharges of waste from feedlot "point" sources.

It is fallacious to compare amounts of human and animal excrement. In the U.S. by far most human waste is immediately places in water-borne sewage systems. Cattle feedlot waste is deposited on soil or concrete surfaces where it undergoes a high degree of biodegradation before applied to land for fertilizer purposes.

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9. **Animal Care**

Myth: Livestock producers subject their animals to unnecessary hardship and inhumane practices.

Fact: Inhumane practices are not only morally wrong; they are not economic. It is in producers' own best interest to take proper care of their animals. Most producers are sensitive to the welfare of their livestock.

Background: Cattlemen take good care of their animals for two reasons: First, they are in the cattle business because they like animals. Second, keeping animals healthy, strong and free of stress and injury is in their own economic interest. Any type of abuse or neglect or harmful practice is counter-productive. If cattlemen are to remain in business and remain on their farms and ranches, they must be efficient producers. That requires proper feeding, health maintenance, care, and handling. Management of cattle involves hands-on-care. Cattlemen and cattle women, not machines, monitor, feed and care for their livestock.

The management practices and feeding and handling programs followed by cattle producers are no accident. They are a result of years of research and experience. Research indicates that producers are doing an excellent job of managing their animals.

Animals that receive the best care are the most productive. Health and reproductive and productive traits continue to be the most readily measurable and most practically useful indicators of compatibility between farm animals and the environments in which they reside. Feeds, management systems and disease control are now better than at any time in the past.

A statement of principles adopted by members of the National Cattlemen's Association includes these points: "I believe in the humane treatment of farm animals and in continued stewardship of all natural resources... believe my cattle will be healthier and more productive when good husbandly practices are used... it is the responsibility of all human goings to care for animals in their charge".

Wildlife: It also may be noted that livestock production on both private and public lands is in many ways responsible for improved habitats and increases in wildlife populations. Private lands in agricultural production provide rangeland, crops, water, wetlands and other food sources and habitat for big game and non-game species in western regions, management of forage and development of water supplies have benefited wildlife as well as livestock. Data show that wildlife numbers have increased in the last 50 years because of resource management by livestock operators and others. A survey of cattle producers showed that 79% have areas that support wildlife.

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10. **Diet and Health**

Myth: The risk of death from heart disease and other diseases can be greatly reduced if a person avoids eating a meat-centered diet.

Fact: Lean beef is regarded by leading health organizations and agencies and a valuable and appropriate part of American diets. The American Dietetic Assn.., The American Heart Association, the National Heart, Lung and Blood Institute and other organizations generally recommend 5-7 oz. Of lean trimmed meat daily. Nutrition authorities point out that trimmed beef provides large amounts of essential nutrients-such as iron, zinc, and vitamin-12 and balances protein.

Background: Excess fat, from any source, can contribute to the development of illness in some people. But beef and fat are not necessarily synonymous. Trimmed beef has been part of diets which have contributed to improved health and to continuing increases in the longevity of Americans. Government statistics show that red meat alone provides 28% of the protein, 23% of

the iron, 36'Yo of the zinc, 52'Yo of the vitamin B-12 which Americans consume. It is a nutrient-dense food, supplying large shares of essential nutrients in relation to the calories it supplies.

There has been a substantial improvement in the ratio of lean to fat in beef carcasses and in retail cuts of beef. The National Beef Market Basket Survey of retail cuts showed that, on average, the thickness of separable fat on steaks and roast had been reduced through closer trimming, to less than 1/8-inch. Comparing survey data to data on the nutrient content of retail cuts in 1986, USDA showed that retail cuts had 27°/o less separable fat than previously reported.

Research on fatty acids has shown that, on average, only 27°/o of the total fat in a serving of beef has the potential to elevate blood cholesterol levels. Also, beef has no more cholesterol than chicken. The amounts of fat, saturated fat and cholesterol in lean, trimmed beef are low enough that beef is included in low-fat diets recommended by scientific organizations.

Properly balanced vegetarian diets can meet nutrient needs, scientists note, but such diets are not easy to formulate. For most persons, animal as well as plant products have been important parts of diets for thousands of years.

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11. **Hormones and Antibiotics**

Myth: The use of antibiotics and hormone growth implants in livestock production is causing hazardous residues in beef and is contributing to the development of health problems in humans.

Fact: No residues from feeding antibiotics are found in beef, and there is no valid scientific evidence that antibiotic use in cattle causes illnesses resulting from the development of antibiotic-resistant bacteria. Scientific authorities agree that use of hormone implants results in the efficient production of lean beef that is safe.

Background: Some persons say that low-level, continuous feeding of penicillin and tetracycline to livestock and poultry for growth promotion may result in development of antibiotic-resistant bacteria and thus contribute to human illness. The National Academy of Sciences say it has never found data directly implicating sub therapeutic use of feed microbial as a risk factor in human illness.

Penicillin is not fed to cattle. For several years, there has been little sub therapeutic feeding of tetracycline to cattle, even though such use continues to be approved as safe. There is no valid scientific evidence that feeding antibiotics to beef cattle causes human health problems. A recent report by USDA's Food Safety & Inspection Service showed no antibiotic residue problems with beef cattle.

Whether or not antibiotics are used in animals, resistant organisms will exist. But all are sensitive to heat, and proper cooking will kill all disease- causing bacteria that may be found in meat products.

Use of hormone growth implants improves efficiency and results in production of more lean meat and less fat in cattle. Hormones are naturally present in infinitesimal amounts in all meat, whether from implanted animals or not. The amounts of estrogen and other hormones in plant-source foods are larger than in meat. The human body produces hormones in quantities much greater than ever would be consumed by eating beef or other foods. Hormones in beef from implanted steers have no physiological significance for humans whatsoever. The estrogen level in a 3-oz. Serving of beef form an implanted steer is 1.85 Nano grams (a Nano gram is a billionth of a gram); the level in the same size portion of beef from a non-implanted steer is 1.01 Nano grams. By comparison, a non-pregnant woman produces 445,000 Nano grams of estrogen daily.

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12. **Pesticides in Food Production**

Myth: Use of pesticides is causing environmental and human illness problems. Meat contains more pesticides than do plant-source foods.

Fact: Government data indicate that, for both plant and animal foods, there is no evidence of chemicals at anything more than a fraction of tolerance levels proven to be safe. USDA's official report for 1989 on residue monitoring of meat showed no volatile pesticide residues in beef.

Background: Monitoring agencies indicate that any residues of crop chemicals are undetectable or are present at only a fraction of tolerance levels in foods.

Residues do not accumulate "up the food chain," in meat as opposed to plant foods. That is because living organisms do not just take up chemicals. They also detoxify, metabolize, biodegrade and excrete any chemicals. As a consequence, only a small fraction of any chemical absorbed is even temporarily deposited in tissues. Actually, animals provide a useful function by biodegrading chemicals, whether natural or man-made. The Food and Drug Administration's total diet studies show that foods supply less than 1% of allowable dietary intakes of crop chemicals. FDA samplings in 1988, together with total diet studies, continued to demonstrate that dietary intakes of pesticide residues are well below standards set by the Food and Agriculture Organization/ World Health Organization.

"Natural" production systems do not result in crops without potentially toxic chemicals. Plants naturally produce "pesticides" to help fight off parasites, insects, birds and animals. In addition, organisms living on plants, such as fungi, may produce toxins.

Use of modern technology makes possible the production for Americans of a more bountiful, more healthful, safer, less costly supply of food.

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