Agriculture Production Challenges

As students develop their projects and gain a thorough understanding of challenges, they examine positive, and negative factors involved in agricultural production (both crops and animals). As the world population grows, healthy and sustainable production of food must keep up with demand. In some cases, a cost-benefit analysis will help students understand the impact of certain decisions on the cost of food production. In other cases, students may explore whether practices sustain food production in healthy ways for the future. Students may analyze and address some of the following challenges listed below as they develop their project:

1. Animal Agriculture: How do we increase and distribute production while maintaining healthy and safe meat and poultry?

In order to feed the world, we want healthy and available flocks or herds of animals, and in turn, a safer and accessible food supply. Students may explore the benefits and costs of animal agriculture. When addressing the costs and benefits of animal production, it is important to consider:

- Use of Antibiotics
- Animal Welfare
- Animal Housing
- Size of Flock or Herd
- Distance and Methods of Transportation
- Environmental Impacts
    - Release of Methane, Carbon and Other Gases into the Atmosphere
    - Water and Air Pollution, Due to Manure
- Concern over Replacing Independent Farmers
- Food Safety Risks

· **Links for Additional Research**:

- Animal Health Institute: http://www.ahi.org/issues-advocacy/animal-antibiotics/
- American Humane Association: http://www.americanhumane.org/animals/programs/farm-animal-welfare.html
- American Veterinary Medical Association: https://www.avma.org/kb/resources/reference/animalwelfare/pages/default.aspx?utm_source=oldsite&utm_medium=prettyurl&utm_term=animalwelfare&utm_campaign=redirect
- Centers for Disease Control and Prevention: http://www.cdc.gov/narms/get-smart.html
- CAFO Air Pollution Facts: http://www.sraproject.org/wp-content/uploads/2016/10/UPDATED-CAFO-POLLUTION-AIR-2015.pdf
- Department of Agriculture's Animal and Plant Health Inspection Service: http://www.aphis.usda.gov/animal_health/index.shtml
- Department of Agriculture's Animal and Plant Health Inspection Service: http://www.aphis.usda.gov/animal_welfare/
- Department of Agriculture's National Agriculture Library--Animal Care Guidelines: http://awic.nal.usda.gov/farm-animals/animal-welfare-audits-and-certification-programs/animal-welfare-audits-and-1

- DoSomething.org: https://www.dosomething.org/facts/11-facts-about-factory-farms-and-environment
- Farm Sanctuary: https://www.farmsanctuary.org/learn/factory-farming/factory-farming-and-the-environment/
- Food & Water Watch: http://www.foodandwaterwatch.org/problems/factory-farming-food-safety Factory Farm Map Campaign: http://www.factoryfarmmap.org/problems/
- Grace: Sustainable Table, Environment: http://www.sustainabletable.org/265/environment
- Natural Resources Defense Council (NRDC): https://www.nrdc.org/issues/reduce-nutrient-pollution-farms
- One Green Planet: http://www.onegreenplanet.org/animalsandnature/factory-farming-is-killing-the-environment/
- Socially Responsible Agricultural Project (SRAP): http://www.sraproject.org/environmental-impact-of-factory-farms/
- The Food and Drug Administration:http://www.fda.gov/forconsumers/consumerupdates/ucm349953.htmThe Huffington Post: Why Factory Farms Threaten Your Health http://www.huffingtonpost.com/john-robbins/meat-antibiotics_b_656414.html
- Time: The Triple Whopper Environmental Impact of Global Meat Production: http://science.time.com/2013/12/16/the-triple-whopper-environmental-impact-of-global-meat-production/
- World Organization for Animal Health: http://www.oie.int/animal-welfare/animal-welfare-key-themes/
- World Organization for Animal Health: http://www.oie.int/en/for-the-media/amr/
- World Organization for Animal Health: http://www.oie.int/animal-health-in-the-world/

2. Cropland: What are the challenges to increasing volume and quality of output, and what are ways in which farms can increase production?

In order to increase production to feed the growing population, farmers must consider the costs and benefits of each of these tools or practices.

- Land use
- Use of Corn in the Production of Ethanol
- Use of Genetically Modified Seeds
- Producing Organic Agriculture
- Pesticide Use
- Transportation Costs
- Distance to Market
- Seed Patent Issues
- Environmental Concerns, Pollution, Carbon Emissions

Links for Additional Research:

- World Bank: http://data.worldbank.org/indicator/AG.LND.AGRI.ZS
- Center for Food Safety: http://www.centerforfoodsafety.org/issues/311/ge-foods/ge-food-and-the-environment The Role of GE Seeds and Patent Systems http://www.centerforfoodsafety.org/issues/303/seeds/the-role-of-ge-seeds-and-the-patent-

system Effects on Farmers & the Environment http://www.centerforfoodsafety.org/issues/303/seeds/effects-on-farmers-and-the-environment Organic Foods: http://www.centerforfoodsafety.org/issues/305/food-and-climate/3-choose-organic-foods

- Department of Agriculture's Economic Research Service: http://www.ers.usda.gov/data-products/major-land-uses.aspx#.UmVFl-A71nI
- Department of Agriculture's National Agricultural Statistics Service: http://usda01.library.cornell.edu/usda/current/FarmLandIn/FarmLandIn-02-19-2013.pdf
- Department of Energy: http://www.afdc.energy.gov/fuels/ethanol_fuel_basics.html
- Environmental Protection Agency: http://www.epa.gov/otaq/fuels/renewablefuels/
- Congressional Budget Office: http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/100xx/doc10057/04-08-ethanol.pdf
- Department of Agriculture's Economic Research Service: http://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us.aspx#.UmVGLeA71nI
- LEAF: Problems Associated with Conventional Farming: http://leafcertified.org/the-apparel-industry/faqs/problems-associated-with-conventional-farming
- MIT: Mission 2014 Feeding the World: Organic Industrial Agriculture: http://12.000.scripts.mit.edu/mission2014/solutions/organic-industrial-agriculture
- Public Broadcasting Service: Should We Grow GM Crops?: http://www.pbs.org/wgbh/harvest/exist/
- Small-Scale Intensive Farm Training: http://sift.ncat.org/small_scale.php
- Sustainable Table: Industrial Crop Production: http://www.sustainabletable.org/804/industrial-crop-production
- Union of Concerned Scientists: Hidden Costs of Industrial Agriculture: http://www.ucsusa.org/food_and_agriculture/our-failing-food-system/industrial-agriculture/hidden-costs-of-industrial.html#.WHfC7VMrKpo
- Yale Environment 360: The Folly of Big Agriculture: Why Nature Always Wins: http://e360.yale.edu/feature/the_folly_of_big_agriculture_why_nature_always_wins/2514/
- The Institute of Food Technologists: http://www.ift.org/food-technology/daily-news/2012/september/21/impact-of-gmos-on-the-future-of-agriculture.aspx
- World Health Organization: http://www.who.int/foodsafety/biotech/en/

- Department of Agriculture's Economic Research Service: http://www.ers.usda.gov/topics/natural-resources-environment/organic-agriculture.aspx#.UmVGjeA71nI
- National Organic Standards Board: http://www.ams.usda.gov/AMSv1.0/NOSB

- Department of Agriculture's Agriculture Marketing Service: http://www.ams.usda.gov/AMSv1.0/nop
- Department of Agriculture's Economic Research Service: http://www.ers.usda.gov/topics/farm-practices-management/chemical-inputs.aspx#.UmVG0-A71nI
- Environmental Protection Agency: http://www.epa.gov/pesticides/food/

3. Environment: What environmental concerns must be factored in during crop production?

Environmental concerns also play a role in agriculture. Weather affects production, and some farming practices may improve the environment for the future. When taking into consideration the environment, think about the following issues:

- Conservation Practices
- Pollution, Carbon Emission, Fossil Fuel Usage
- Irrigation and Water Use
- Weather (drought, floods, etc.)

- **Links for Additional Research:**

  - Cornell University: Center for Environmental Research and the Dept. of Agronomy: http://psep.cce.cornell.edu/facts-slides-self/facts/mod-ag-grw85.aspx

  - Department of Agriculture's Natural Resources Conversation Service: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/?cid=stelprdb1041269

  - National Sustainable Agriculture Coalition: http://sustainableagriculture.net/publications/grassrootsguide/conservation-environment/

  - Phys.org: Largest-ever study reveals environmental impact of genetically modified crops: https://phys.org/news/2016-09-largest-ever-reveals-environmental-impact-genetically.html

  - Department of Agriculture's Office of the Chief Economist: http://www.usda.gov/oce/weather/

  - AG Web: Weather News: http://www.agweb.com/weather/agriculture_weather.aspx

  - Department of Agriculture's Economic Research Service: http://www.ers.usda.gov/topics/farm-practices-management/irrigation-water-use.aspx#.UmVF3uA71nI

  - Environmental Protection Agency: http://www.epa.gov/agriculture/tsur.html

  - Sustainable Table: Grace: Environment: http://www.sustainabletable.org/265/environment
  - The Water Project: Water Scarcity and Agriculture: https://thewaterproject.org/water-scarcity/water-scarcity-and-agriculture
  - World Wide Fund For Nature: http://wwf.panda.org/what_we_do/footprint/agriculture/impacts/