Animals in Agriculture

Module 6
Student Handouts

Instructions: Print one copy per 2-3 students: pages 1-11, **double-sided, on the short-edge**: pages 24-28

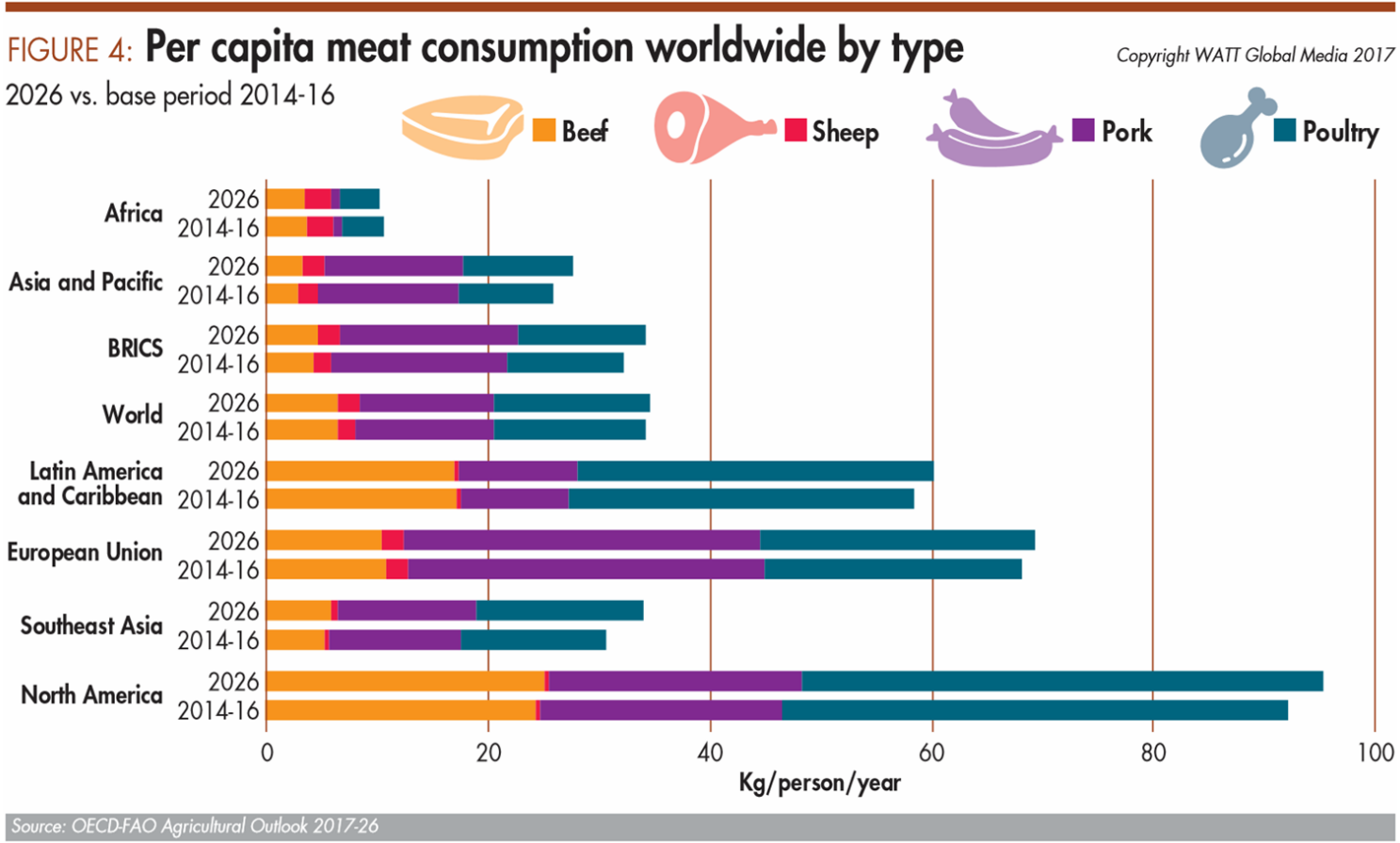
Print one copy per student: page 12

Print one copy total, **double-sided, on the short-edge**: pages 14-23

Cut out card sets on pages 16-23

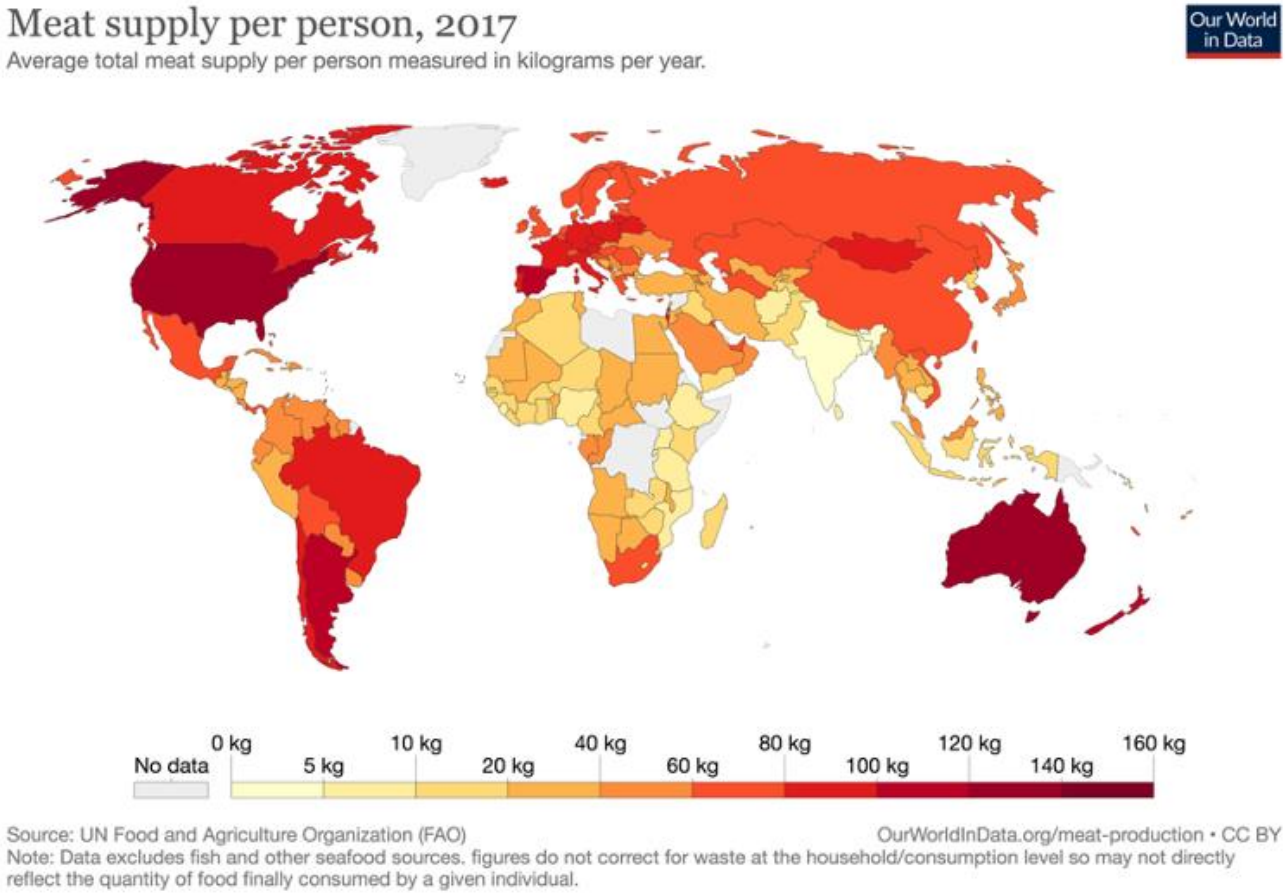
Food Up!

Activity #1: Meat Consumption Charts



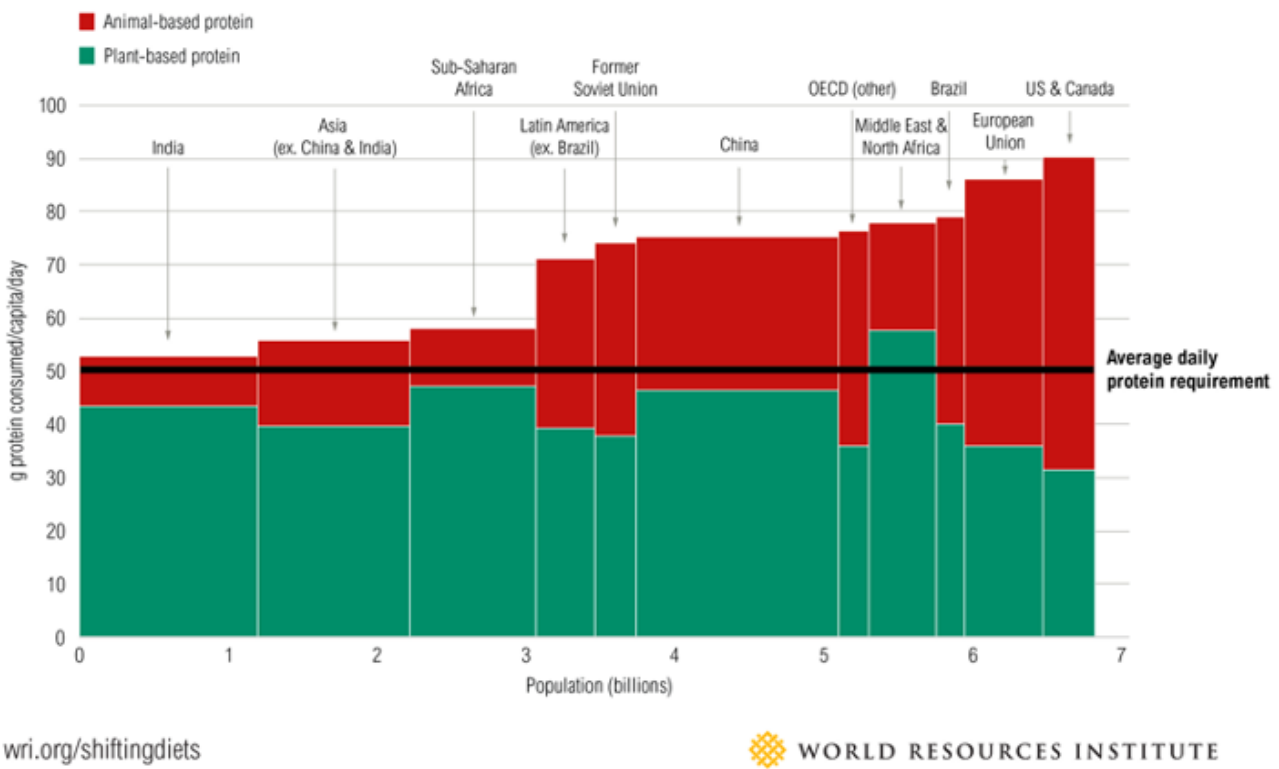
Note: Taken from "Per capita meat consumption worldwide by type 2014-16 VS. 2026, by *Watt Global Media*, 2017, https://www.wattagnet.com/Per-capita-meat-consumption-worldwide-by-type-2014-16-vs-2026.

Activity #1: Meat Consumption Charts



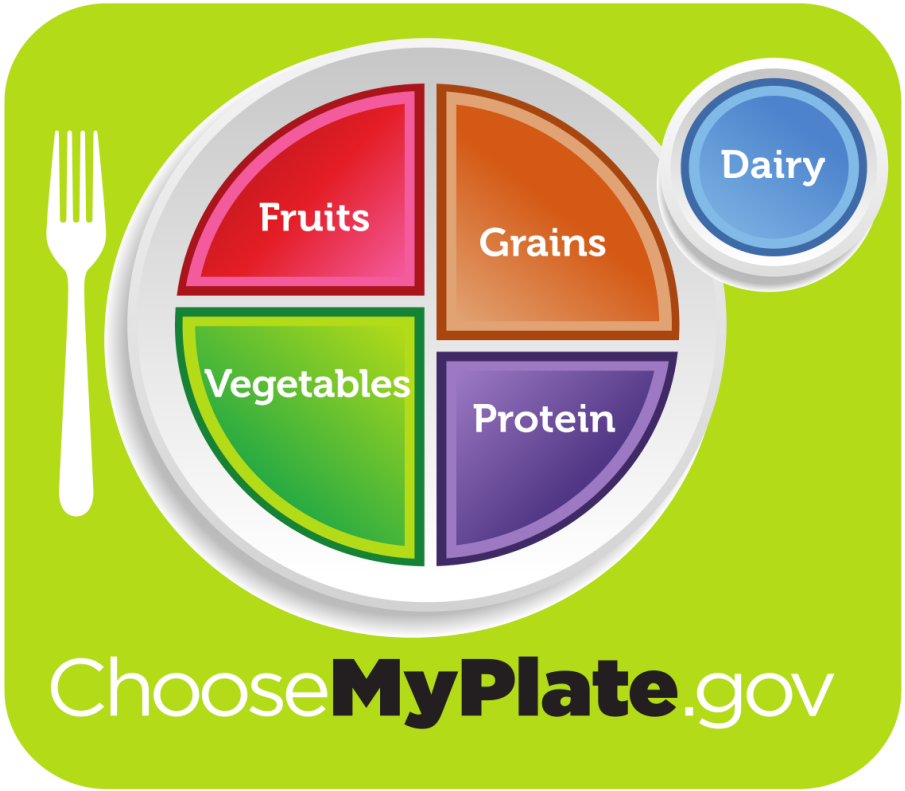
Note: Taken from "Meat and Dairy Production," by H. Ritchie, P. Rosado, & M. Roser, 2019, Our World in Data (https://ourworldindata.org/meat-production#citation).

Activity #1: Meat Consumption Charts



Note: Taken from "Shifting Diets for a Sustainable Food Future: Creating a Sustainable Food Future, Installment Eleven," by J. Ranganathan, D. Vennard, R. Waite, B. Lipinski, T. Searchinger, & P. Dumas, 2016, World Resource Institute (https://www.wri.org/research/shifting-diets-sustainable-food-future).

Activity #1: Food Pyramids



Note: Taken from “MyPlate,” by U.S. Department of Agriculture (https://www.myplate.gov/).

Activity #1: Food Pyramids – USDA MyPlate Recommendations

Protein

"All foods made from seafood; meat, poultry, and eggs; beans, peas, and lentils; and nuts, seeds, and soy products are part of the Protein Foods Group."

"Select a wide variety of protein foods to get more of the nutrients your body needs and for health benefits. Meat and poultry choices should be lean or low-fat, like 93% lean ground beef, pork loin, and skinless chicken breasts. Choose seafood options that are higher in beneficial fatty acids (omega-3s) and lower in methylmercury, such as salmon, anchovies, and trout. The advice to consume lean or low-fat meat and poultry and a variety of seafood does not apply to vegetarians. Vegetarian options in the Protein Foods Group include beans, peas, and lentils, nuts, seeds, and soy products."

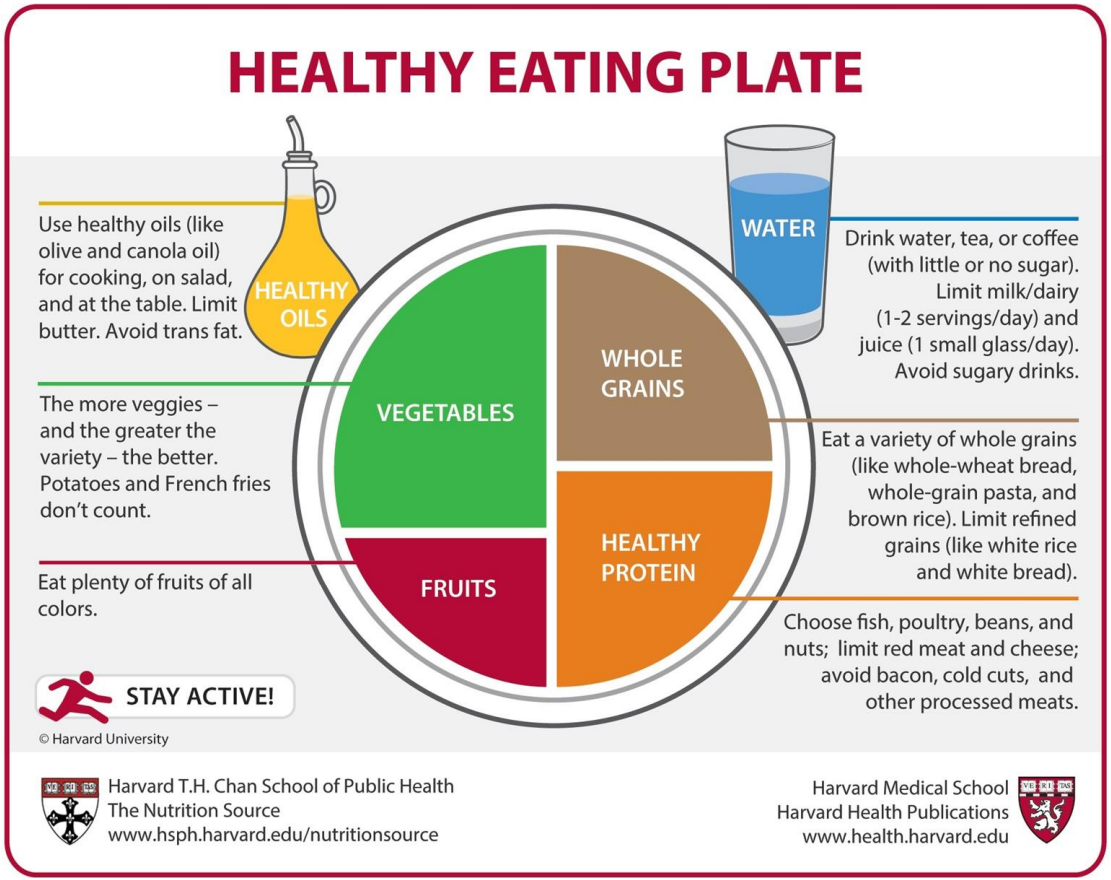
Dairy

"The Dairy Group includes milk, yogurt, cheese, lactose-free milk and fortified soy milk and yogurt. It does not include foods made from milk that have little calcium and a high fat content, such as cream cheese, sour cream, cream, and butter."

"About 90% of Americans do not get enough dairy, therefore most individuals would benefit by increasing intake of fat-free or low-fat dairy, whether from milk (including lactose-free milk), yogurt, and cheese, or from fortified soy milk or yogurt."

Source: U.S. Department of Agriculture. *MyPlate.* https://www.myplate.gov/

Activity #1: Food Pyramids – Harvard Medical School's Healthy Eating Plate



Note: Taken from "Healthy Eating Plate," by Harvard T.H. Chan School of Public Health, *The Nutrition Source,* 2023 (https://www.hsph.harvard.edu/nutritionsource/healthy-eating-plate/).

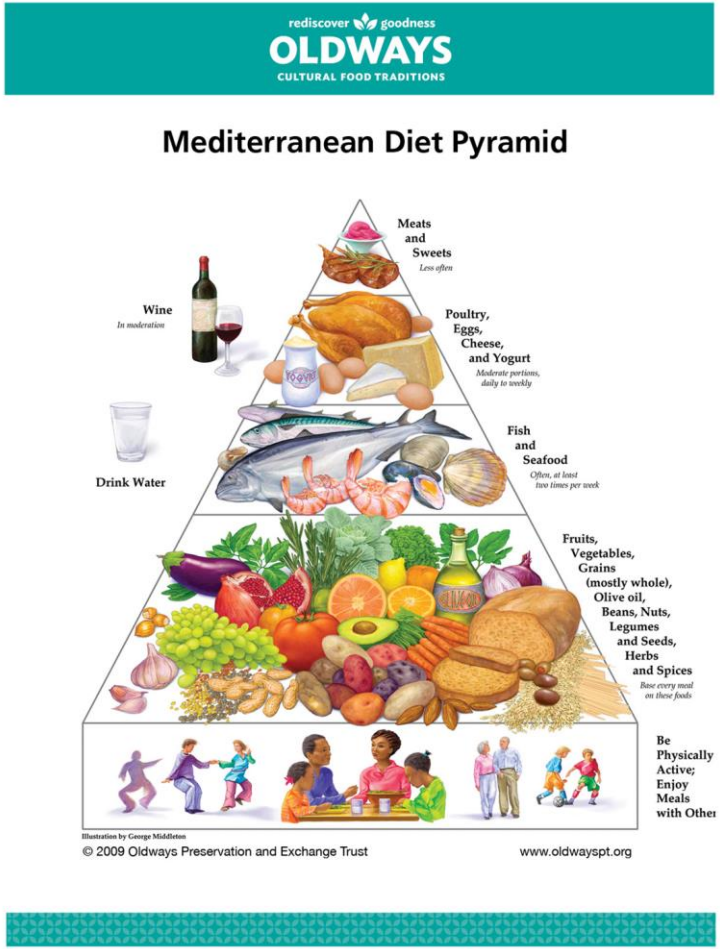
Activity #1: Food Pyramids

Key Differences between MyPlate and Health Eating Plate

- USDA's MyPlate "protein section offers no indication that some high-protein foods — fish, poultry, beans, nuts — are healthier than red meats and processed meats," while the Healthy Eating Plate indicates that red meat and cheese should be limited.
- USDA's MyPlate does not mention beneficial fats like olive and canola oil.
- "USDA recommends dairy at every meal, even though there is little evidence that high dairy intake protects against osteoporosis but substantial evidence that high intake can be harmful."

Source: Datz, T. (2011). *Healthy eating plate shows shortcomings in government's MyPlate.* The Harvard Gazette. https://news.harvard.edu/gazette/story/2011/09/harvard-serves-up-its-own-plate/

Activity #1: Food Pyramids



Activity #1: Food Pyramids

rediscover goodness
OLDWAYS
CULTURAL FOOD TRADITIONS

African Heritage Diet Pyramid

Illustration by George Middleton

www.oldwayspt.org

Activity #1: Food Pyramids

rediscover goodness
OLDWAYS
CULTURAL FOOD TRADITIONS

Asian Diet Pyramid

www.oldwayspt.org

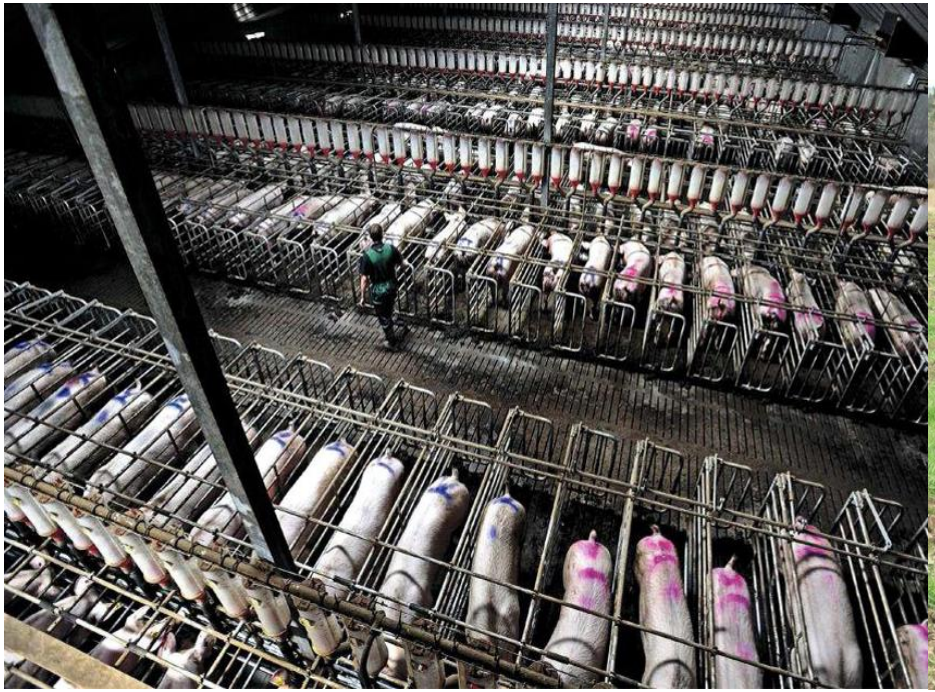
Activity #1: Food Pyramids

Activity #1 – Pyramid Comparison Worksheet

	Differences	Similarities
MyPlate and Healthy Eating Plate		
Traditional Diets		
Traditional Diets (Generally) and Healthy Eating Plate		
My Diet and Traditional Diets		


Food Up!

Activity #3: Industrial vs. Ecological Farming: Pigs



Farms not Factories. *Sow stalls* [photograph]. https://farmsnotfactories.org/the-true-costs-of-factory-farming

Deck Family Farm. (2015). *Mama sow with piglets training to pasture* [photograph]. https://deckfamilyfarm.com/livestock/pasture-raised-pork

Activity #3: Industrial vs Ecological Farming: Chickens

World Animal Protection. (2019). *32 day old broiler (meat) chickens in a commercial indoor system* [photograph]. https://www.worldanimalprotection.org.uk/blogs/10-things-you-should-know-about-factory-farmed-meat-chickens

Bare, M. & Ziegler-Ulsh, C. (2012). *How to establish a small-scale, pastured poultry operation* [photograph]. https://rodaleinstitute.org/blog/how-to-establish-a-small-scale-pastured-poultry-operation/

Activity #3: Meat Effect Card Set

Lobbying Power Against Safety and Environmental Regulations	Air Pollution and Childhood Asthma	Fast Slaughter Line Speed
High Injury Rates	Property Value	Worker Injury
Falling Wages	Centralized Ownership of Infrastructure	Externalized Damage

To maximize profits, industrial slaughterhouses can process up to 400 cattle/hr.[2]	Confined Animal Feeding Operations produce air pollution that has been associated with childhood asthma in areas around the operation.[3]	The centralized beef industry holds powerful lobbying power. Large companies have been able to band together to limit governmental safety and environmental regulations for the beef industry.[2]
Do to factors such as processing line speed, sharp tools, strong chemicals, and hot pressurized water, meat processing workers face injuries such as torn muscles, pinched nerves, deep cuts, and even amputated fingers.[2]	Properties located within three miles of a Confined Animal Feeding Operation lose up to 26% of their property value.[1]	Injury rates for workers in animal agriculture are 6.7 per 100 workers. The injury rate for the US workforce as a whole is 3.8 per 100 workers.[2]
Many of the industrialized beef industry's effects on the environment and community are externalized costs. This means the industry has costly effects, but does not have to pay for them. Instead, taxpayers pay for them, or the damage goes uncorrected.[2]	Four companies control 80% of the beef market in the United States. These companies own most of the infrastructure along the production chain, limiting access to processing facilities for small and mid size farmers.[2]	The growing corporate control of meat production has been associated with falling wages and benefits for workers and increased use of both legal and illegal immigrant labor in livestock production and processing.[4]

Financial Instability for Farmers	Low Wages	Global Meat Consumption Rates
Illness due to E. Coli Contamination	Antibiotic overuse leads to ineffective antibiotics in human medical system	Deforestation and Unavailability of Traditional Indigenous Lifestyles
Fast Slaughter Line Speeds	Dangerous Drinking Water Requires Filtration	Heart Disease Risk

The average person on our planet eats 102.5 pounds of meat per year. Luxembourg and the United States eat 301.4 and 270. 7 pounds per person, respectively, while Bangladesh and India eat 7.9 and 7.1 pounds, respectively.[5]	The consolidation of meat industries has resulted in falling wages and benefits for workers. To move chickens to slaughter, workers are hired to catch all chickens in a barn in one night, two in each hand. Workers are paid $2.25 per 1,000 birds caught.[14]	The chicken industry controls the sale price for chickens to slaughter, and often pays less than the cost to raise the birds. Farmers can take out $1 million loans to cover the cost of infrastructure to raise chickens, and often never pay the loan back due to this predatory pricing system.[14]
Deforestation has forced native people from their homelands, destroying traditional ways of life.[7] The beef industry was responsible for removing 45.1 million hectares of forest land between 2001 and 2015, a rate five times higher than any other product the Eurogroup analyzed.[13]	Crowded conditions in Confined Animal Feeding Operations have required the regular use of antibiotics to fight disease in animals. Many chickens are forced to live in a space smaller than the size of an A4 piece of paper.[12] Bacteria have begun to evolve to survive these antibiotics due overusage, making it harder to treat bacterial infections in animals.[14]	Cows have evolved to eat a grass fed diet. When forced to eat grains, their stomachs become more acidic than usual, creating a friendly environment for E. coli. Grain fed diets and fast processing lines contribute to E.coli contamination in beef. 29% of deaths due to foodborne illness have been traced to salmonella and E. coli in beef.[2]
A diet high in red meat consumption has been linked to increased risk of heart disease.[6]	Concentrated manure from confined animal feeding operations often results in high nitrogen rates in groundwater. Households, not the CAFOs, must pay for household filtration systems to filter the dangerous nitrate out of their water.[2]	The workplace is ruled by the line. The federally-allowed speed for the slaughter line has more than doubled in the last four decades, from 70 birds per minute in 1979 to 140 birds per minute today.[14]

Greenhouse Gas Production	High Land Use	Deforestation
Dangerous Air Pollution	Dry Colorado River	Extinction of Species and Biodiversity
Animal Waste Causing Fish Kills	Manure Waste Management Challenges	High Water Use

There is a strong link between beef production and deforestation. 45.1 million acres of forest were cut down for cattle pasture between 2001 and 2015, creating five times more deforestation that any other product.[8]	It takes 10 lbs of corn to to produce 1 lb of beef. The more meat we eat, the more land must be cleared to grow corn.[4]	World livestock accounted for 18% of human generated greenhouse gasses in 2008.[4]
Many species can only live in one type of habitat. 80% of terrestrial species live in forests. We are currently undergoing a mass extinction of species around the world, mainly due to agriculture.[8]	85% of water taken from the Colorado River in California, Arizona, and Nevada is for agricultural purposes. The Colorado River has now dried up before it reaches its historical destination. 87% of irrigated corn is grown in areas under water stress.[11]	Confined Animal Feeding Operations are sources of fine airborne particulates, ammonia, hydrogen sulfide, and odor. All these pollutants are dangers to the air quality, workers and community at large. In Iowa alone, there have been 19 deaths of CAFO workers due to hydrogen sulfide exposure from liquid manure.[10]
It takes about 145 gallons of water to produce one loaf of bread, 1,849 gallons of water to produce 3.5 oz of beef.[15]	Typical beef or dairy cow excretes about 120 lbs of manure per day, most CAFOs produce as much manure as a small city.[11]	¼ of Iowa fish kills are due to animal waste leaching into riverways.[9]

✂ Activity #4: Regenerative Agriculture Card Set

Animal Welfare	Soil Health	Nutrient Cycling and Manure Management
Human Nutrition	Informal Savings Accounts	Triple Bottom Line: Community, Environment, and Economy in cooperatively owned processing facilities
Low Upfront Costs	Reduced Irrigation Needs	Healthy Pollinators

When animals are raised on pasture, manure goes straight back to the land animals were fed on. This improves soil health and greatly reduces nutrient runoff into waterways.	In a pastured system, land does not need to be plowed for feed. Grass roots stay intact, reducing erosion and maintaining healthy soil. Rotationally grazed pastures have more earthworms and diverse soil microorganisms.[17]	Animals in pastured systems can spread out and engage in social behaviors. Calves stay with their mothers, and chickens can spread their wings, nest,and perch.[18] Less crowding reduces flies, parasites, and antibiotic usage.[17]
Cooperatively owned animal processing facilities have been created make it easier for small farmers to bring their product to market and keep wealth local. Cooperatives often use a “triple bottom line” model. Not only do they aim for economic profit, but they also aim to be a benefit to the community and the environment.[19]	In many cultures, animals serve as informal savings accounts. As such, the stewardship of animal herds is a way for people to accumulate wealth and save, without access to banks, credit card, or cash money. Beyond their economic worth, these animals are valuable as they signify wealth accumulation and status, while also retaining cultural and social value.	One pasture raised egg contains three times the Vitamin the Vitamin D, double the Omega 3 fatty acids, four times the Vitamin E, and seven times the Vitamin A as industrially raised eggs.[22]Animals are an incredibly important source of nutrition for people, especially in food insecure areas.
Grasslands not only provide important pollinator habitat, but they reduce reliance on pollinator harming pesticides to grow crops for animal feed.[21]	Pasture raised cattle rely much more heavily on rainwater, rather than irrigation, for their feed.[2]	Confined animal feeding operations require a high investment in infrastructure and supplements. These operations cost two to six times more to set up than pasture based operations.[24]

The Gardener's Secret Scavenger Hunt: Insect List

Pollinators

Honey Bee

Pollinator

Monarch Butterfly

Pollinator

Silphium Borer Moth

Pollinator

Decomposers

Blowflies

Decomposer

Fruit flies

Decomposer

Black Soldier Flies

Decomposer

Decomposers	Pollinators
Blowflies Blowflies are essentially nature's cleanup crew! They lay eggs in moist areas that hatch into larvae, consumes decaying matter, and breaks down organic material. Through digestion, these flies release nutrients back to the soil. They are thus effective recyclers and scavengers.	**Honeybees** Honeybees pollinate more than 100 commercially grown crops in the US, adding 18 billion dollars in agricultural productivity to the economy.[25] Hives work together as a queen bee lays eggs, drones fertilize eggs, and worker bees build honeycomb, collect nectar, create honey.
Fruit flies Fruit flies often exist in large populations on compost heaps in gardens. Although often considered a pest of human dwellings, adult fruit flies, along with young larvae, feed on ripe and decaying fruits and vegetables.	**Monarch Butterfly** 180,000 plant species worldwide depend on pollinors, like the monarch butterfly. Climate change, pesticide use, and loss of habitat are devastating for monarch butterfly populations. We can increase their populations by planting milkweed and supporting biodiverse practices.[26]
Black Soldier Flies (BSFs) BSF larvae eat a variety of decomposing material, from compost to rotting meat. The larvae reduce odor and disease by chewing and processing waste. It then converts it into food for poultry and fish. Though the larvae have strong chewing mechanisms, the adult fly does not bite or pester humans.	**Silphium Borer Moth** These moths contribute not only to agricultural production, but also to pollinating plants that draw carbon out of the atmosphere and prevent soil erosion. Like many pollinators, they are an endangered species that we can support by planting native plants and supporting biodiverse farming practices.[26]

Aerators

Ants

Earthworms*
(*not insects, but annelids)

Redworms*
(*not insects, but annelids)

Pest Managers

Green Lacewig

Lady Beetles

Damsel Flies

Pest Managers	Aerators
Green Lacewings These delicate insects feed on pollen, nectar, mites, and other insects. Some species are mainly predatory, often feeding on aphids (Aphids damage garden crops by transmitting plant disease and piercing stems of fruiting plants, causing deformities and decimating yields).[29] Lacewings are the natural enemies of many types of pests, and are sometimes used as a form of biological pest control.	**Ants** Ants dig tunnels and create nests in soil that increase water infiltration and soil aeration, allowing water and oxygen to reach plant roots and promoting good microbial activity. Plant parts, seeds, and other dead or decaying materials carried by ants (as their food) also contributes to topsoil, enriching soil organic carbon and nitrogen.[27]
Lady Beetles (Ladybugs) As natural predators, lady beetles eat other insects, including pests that damage crops (like aphids). In their adult stage, lady beetles consume about 50 aphids per day (up to 5,000 in a lifetime!). Their red and black coloring serves as a warning, discouraging other animals from eating them.[28]	**Earthworms** Not only are earthworms great decomposers, but they also aerate soil, allowing water, oxygen, and nutrients to infiltrate to roots. Perhaps no other living organism is as critical as the earthworm in promoting soil health. Earthworms also support soil structure, nutrient cycling, water movement, and plant growth.
Fireflies (lightning bugs) These unique beetles use bioluminescence to attract a mate (and ward off predators). They also often feed on soft bodied insects including cutworms, which are notorious for cutting entire tomato plants and destroying other crops by wrapping around the base stem and killing the plant.[28]	**Redworms** Like earthworms, redworms not only aerate the soil, but they also break down decaying material and turn it into bioavailable nutrients for plant roots. As scavengers, redworms gorge on decomposing matter, and in the process they leave behind castings (excrement) rich in nitrogen, phosphorus and potassium, which are great for the soil.

The Gardener's Secret Scavenger Hunt Checklist

Pollinators	Decomposers	Aerators	Pest Managers
❑ Honey Bee ❑ Monarch Butterfly ❑ Silphium Borer Moth	❑ Blowflies ❑ Fruit flies ❑ Black soldier flies	❑ Ants ❑ Earthworms ❑ Redworms	❑ Green lacewig ❑ Lady beetles ❑ Damsel flies

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Activity 3 Card Set Information

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Activity 4 Card Set Information

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Insect Scavenger Hunt: The Gardener's Secret

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