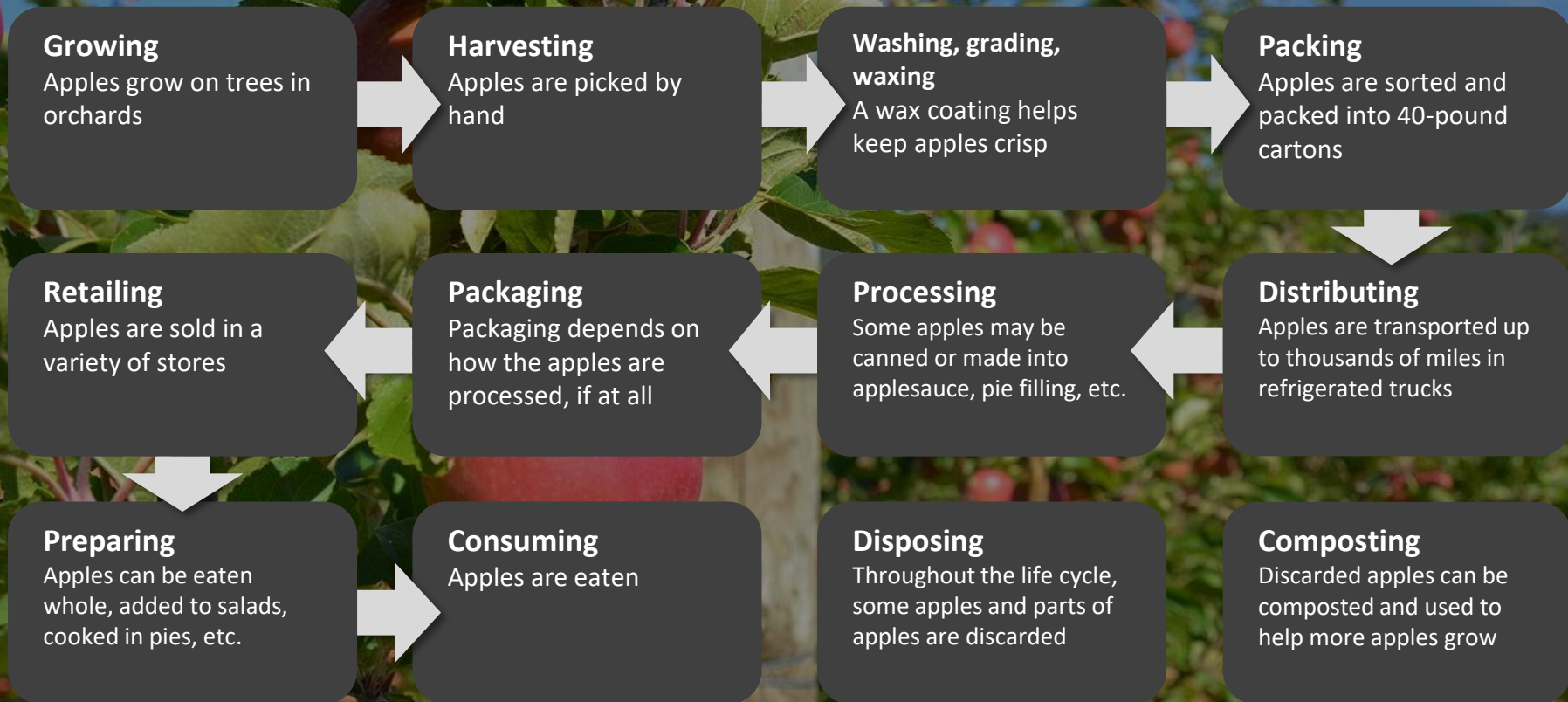


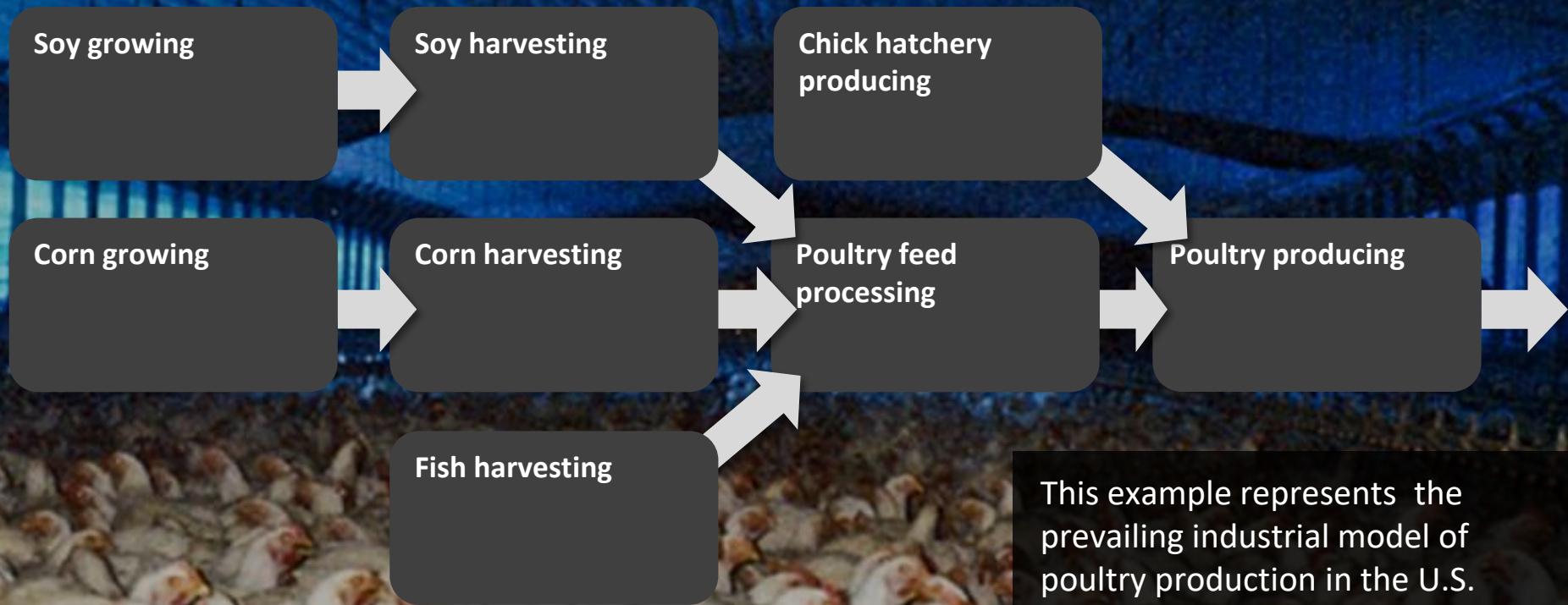
Washington Apple Supply Chain



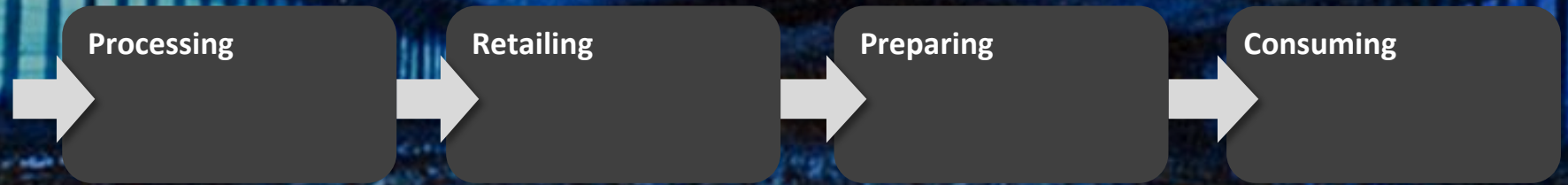
Adapted, with permission, from *Discovering the Food System*. www.hort.cornell.edu/foodsyst/.

Photo credit: Apple and Pear Australia Ltd. Flickr. Creative Commons CC-BY 2.0.

Broiler Chicken Supply Chain



Broiler Chicken Supply Chain (continued)



In this example, the chicken is minimally processed. Foods such as chicken nuggets would require additional processing steps.

Farms, Then and Now



Photo credits: Carl G. von Iwonski. John Mack Farragher. Yeoman farm families. *One Out of Many: A History of the American People*, Pearson, 2011.
Dan Davison. John Deere combine and tractor at work. Wikimedia Commons. Creative Commons CC BY 2.0.

Agriculture Timeline

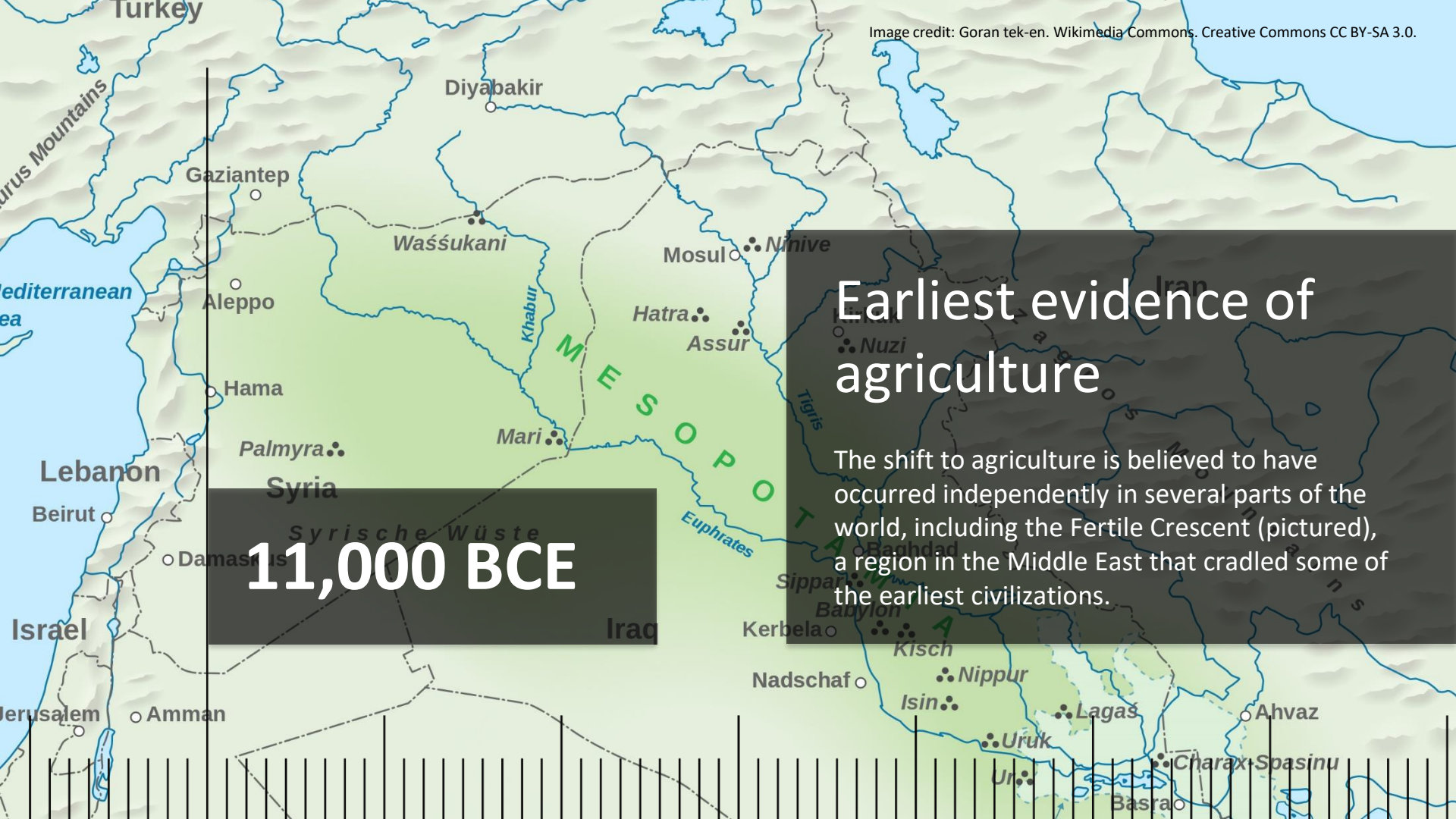


194,000 BCE

Earliest evidence of Homo sapiens

For the vast majority of human history, food was acquired through hunting and gathering. Some peoples, such as the San (pictured), still follow a hunter-gatherer lifestyle.





Earliest evidence of agriculture

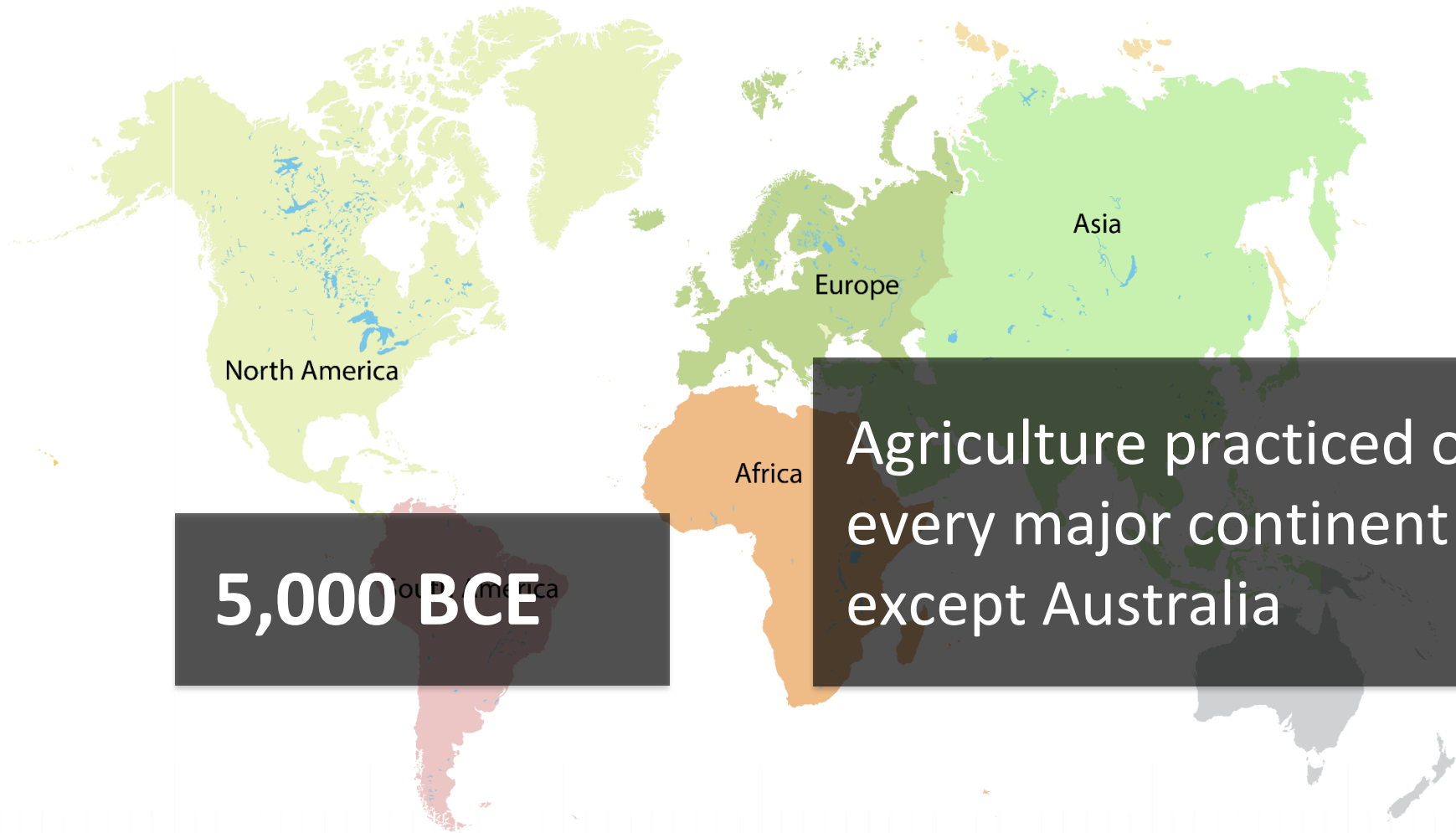
The shift to agriculture is believed to have occurred independently in several parts of the world, including the Fertile Crescent (pictured), a region in the Middle East that cradled some of the earliest civilizations.

11,000 BCE



6,000 BCE

**Most species of
farm animals
domesticated**



North America

Europe

Asia

Africa

5,000 BCE

Agriculture practiced on every major continent except Australia

A green tractor is pulling a white cylindrical ammonia tank through a field of harvested corn. The tank has "CAUTION AMMONIA" and a hazard symbol printed on it. The background shows a rural landscape with green fields and a blue sky with light clouds.

1900s

Widespread adoption of industrial agriculture

Synthetic nitrogen fertilizers (pictured), introduced in the 1900s, have been credited with providing the lion's share of the world's food over the 20th century. Pesticides and monocultures are also hallmarks of industrial agriculture.



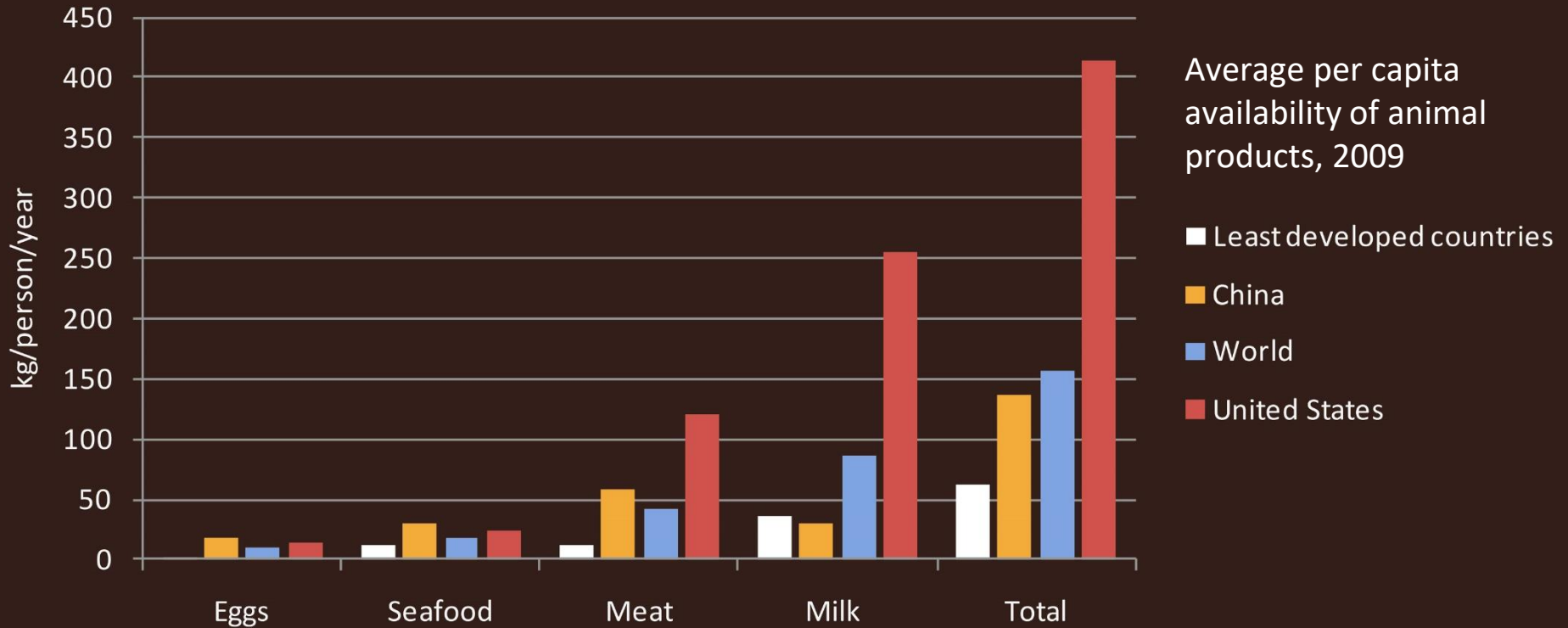
The 1930s Dust Bowl demonstrated the devastating potential of soil erosion.
See the *Crop Production* primer for details. Photo credit: NOAA, 1935. Public domain.

Ecological Impacts

Potential ecological impacts of industrial crop production:

- Soil erosion
- Decrease in bee populations
- Emergence of pesticide-resistant weeds
- Aquatic dead zones
- Depletion of phosphorous and fossil fuels
- Depletion of groundwater

Global Animal Product Consumption



A large indoor chicken farm with many white chickens. The chickens are packed closely together, filling the lower two-thirds of the frame. The background shows the structure of the farm, including a blue-tinted wall with vertical slats and a dark roof. A black rectangular box is overlaid on the upper right portion of the image, containing white text.

Chickens raised for meat

Photo credit: Farm Sanctuary. www.farmsanctuary.org.

Hogs

A long, narrow aisle in a large indoor hog farm. The aisle is flanked by rows of metal cages, each filled with numerous pink hogs. The hogs are packed closely together, and some are looking towards the camera. The floor is concrete, and the ceiling is made of metal beams and pipes. The lighting is bright, coming from overhead fixtures. The overall scene depicts a large-scale commercial hog farming operation.

Photo credit: Jeff Vanuga, USDA Natural Resources Conservation Service.

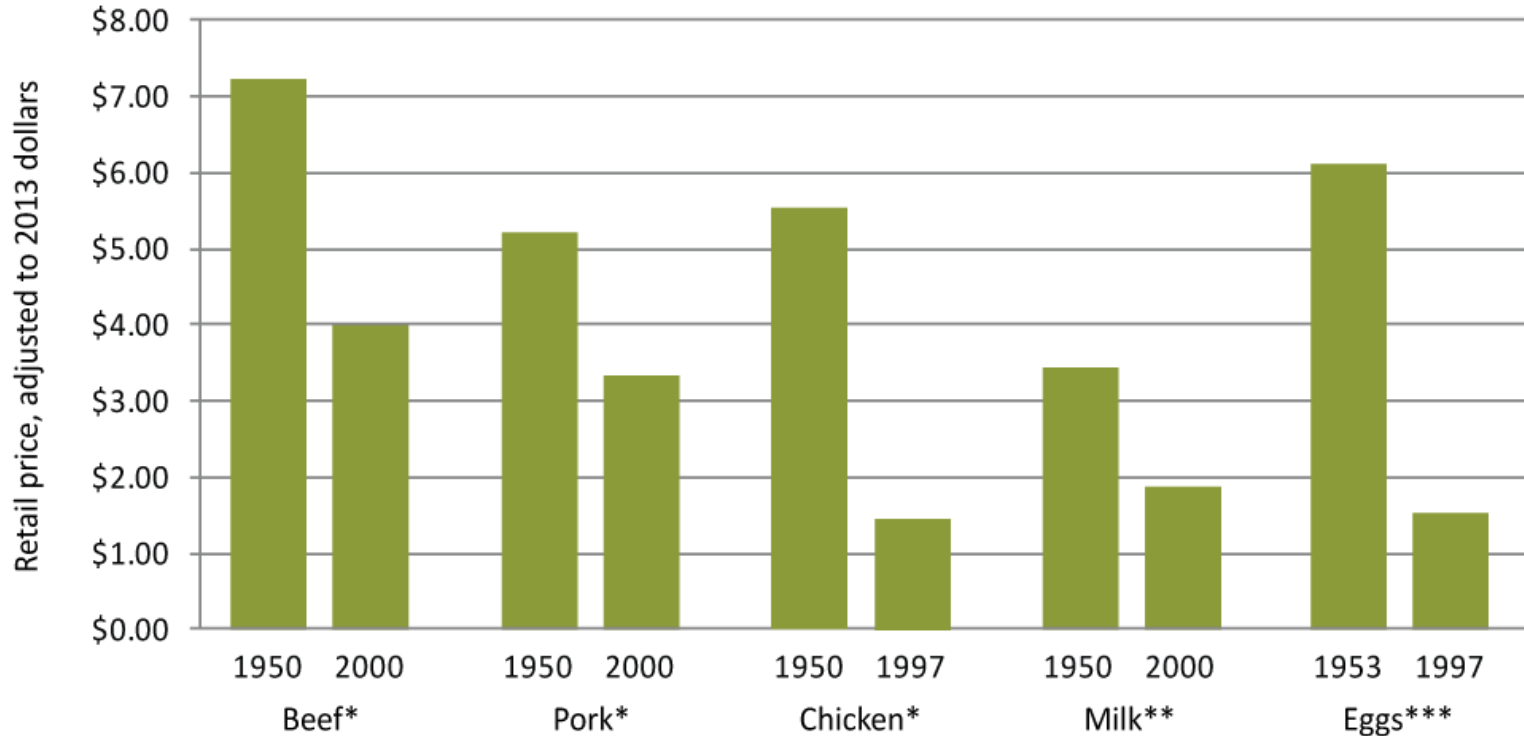


Laying hens

Beef cattle on feedlot



Animal Product Prices, 1950-2000



*Per pound, **Per half gallon, ***Per dozen. Data source: USDA Economic Research Service.



Seafood Production

About 400 tons of mackerel caught in a purse seine (a type of net) in Chile.

Most global seafood harvests use gigantic nets that are pulled through the water or along the sea floor.

Photo credit: C. Ortiz Rojas, 1997. NOAA Photo Library.



Seafood Production

Separating shrimp from bycatch.

In the shrimp harvesting industry, only 5 percent of what some trawlers catch is actually shrimp, and the rest is bycatch.

Source: Davies RWD, Cripps SJ, et al. Defining and estimating global marine fisheries bycatch. *Mar. Policy* 2009;33(4):661-672.

Photo credit: National Oceanic & Atmospheric Administration, 1969. NOAA Photo Library.



Seafood Production

Shrimp farms in Vietnam.

In 2011, the U.S. imported 91 percent of its seafood.

Source: NOAA Fisheries Posts Statistical Report Card for U.S. Fisheries in 2011. *NOAA Fish.* 2012.

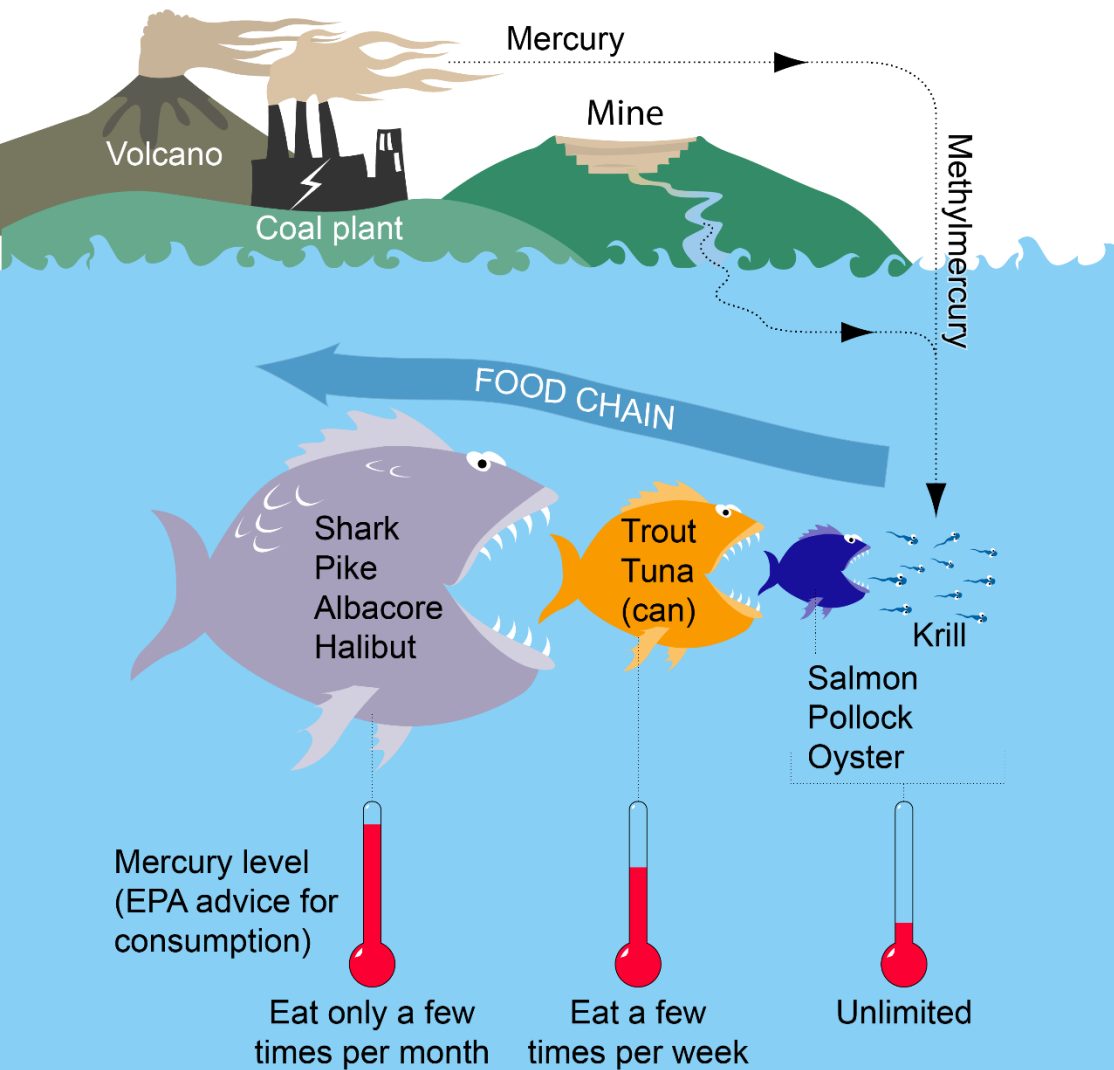
Photo credit: American Museum of Natural History, 2009. Creative Commons CC BY-NC-SA 2.0. <https://creativecommons.org/licenses/by-nc-sa/2.0/>



Seafood Production

On this Australian farm, oysters are raised in submerged bags attached to poles.

Photo credit: Saoysters, 2009. Wikimedia Commons. Creative Commons CC BY 3.0. <https://creativecommons.org/licenses/by/3.0/deed.en>



Seafood Safety

These guidelines are designed to protect children and pregnant people.

Source: U.S. Environmental Protection Agency.

Image credit: Bretwood Higman, 2009. Creative Commons CC BY 3.0. <https://creativecommons.org/licenses/by/3.0/deed.en>



Sustainable

- Ecologically sound
- Economically viable
- Socially just



Efficiency

Agroecology recycles and reuses resources whenever possible, just as natural systems continually recycle rainfall and organic matter.

Composting (pictured) recycles organic matter, converting waste into fertilizer to help crops grow.



Self-sufficiency

Agroecology requires minimal inputs beyond what Nature already provides (sunlight, soil, water, and biodiversity).

Dryland farming (pictured) relies exclusively on rainwater and soil moisture.

Diversity

Agroecology makes use of many different species of plants and animals on the same farm, and benefits from their interactions.

Growing a variety of different crops (pictured) and rotating them over time helps control pests.





Resilience

Agroecology can better withstand and recover from shocks like floods, hurricanes, and droughts.

Contour farming (pictured) can help reduce soil erosion during heavy storms.

U.S. Food System Greenhouse Gas Emissions

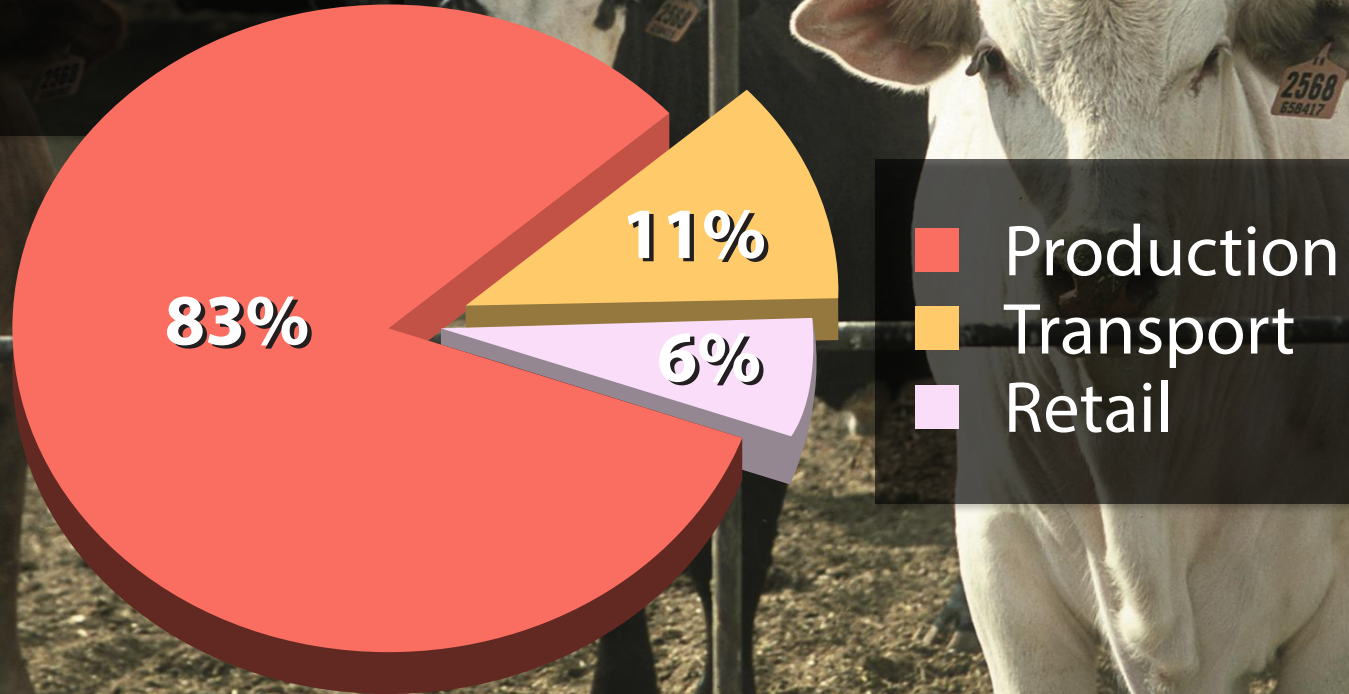
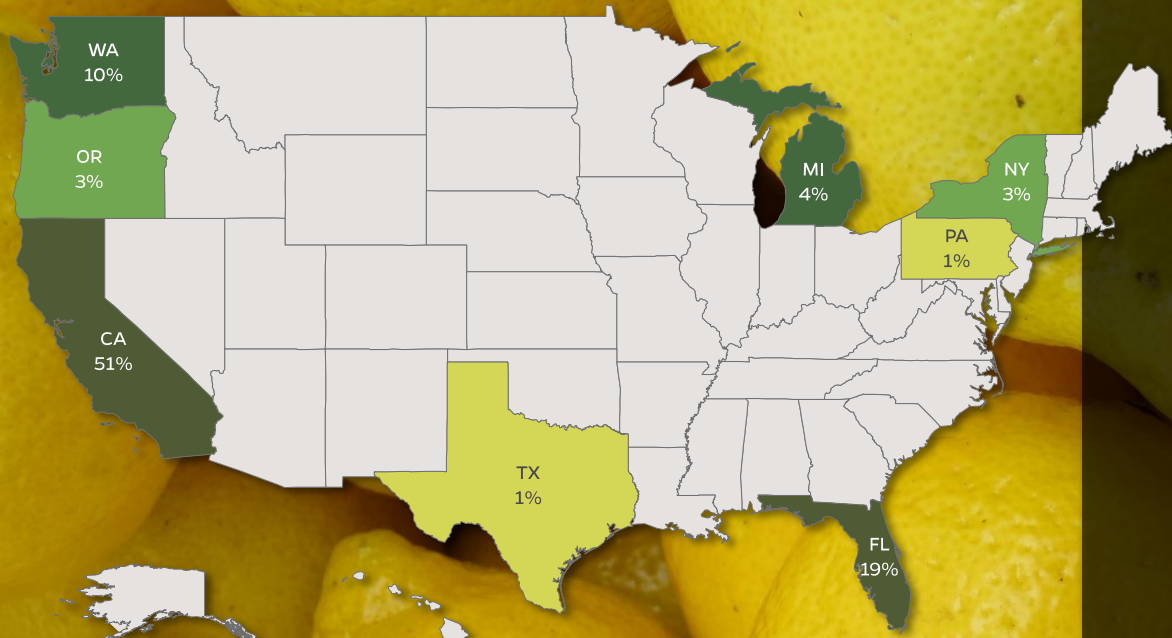


Photo credit: Jeff Vanuga, USDA Natural Resources Conservation Service.

Data source: Weber CL, Matthews HS. Food-miles and the relative climate impacts of food choices in the United States. *Environ Sci Technol.* 2008;42(10):3508-3513.



Top U.S. States in Fruit Production

California harvests about half of U.S. fruit.

Florida harvests almost one-fifth of U.S. fruit.

Photo credit: Leo Horrigan, CLF.

Data source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *Citrus Fruits 2010 Summary and Noncitrus Fruits and Nuts 2010 Preliminary Summary*.

Nutrition Facts

Federal law requires this label on most foods.
Includes information about:

- Serving size
- Calories
- Fats and cholesterol
- Sodium
- Carbohydrates
- Fiber
- Sugars
- Protein
- Vitamins and minerals

Nutrition Facts

Serving Size 1/6 Sheet (41g /1.5oz)
Servings Per Container 12

Amount Per Serving

Calories 160 Calories from Fat 90

% Daily Value*

Total Fat 10g **15%**

 Saturated Fat 5g **25%**

 Trans Fat 0g

Cholesterol 0mg **0%**

Sodium 140mg **6%**

Total Carbohydrate 16g **5%**

 Dietary Fiber 1g **4%**

 Sugars 1g

Protein 3g

Vitamin A 0% • Vitamin C 0%

Calcium 0% • Iron 6%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Ingredients

Listed in descending order
by weight.

Calories per gram
Fat 9 Carbohydrate 9 Protein 9

Ingredients

Select potatoes, expeller pressed high oleic sunflower oil, seasoning (lactose, dextrose, salt, sodium diacetate, garlic powder, onion powder, citric acid, malic acid, dill weed and spice extractive).

Contains milk.

No MSG



USDA Organic

Requirements include:

- No synthetic fertilizers
- Most pesticides are prohibited
- No hormones or antibiotics in animals
- No genetically engineered organisms
- Animals must be able to express certain natural behaviors (e.g., grazing)



Natural

No:

- Artificial colors
- Artificial flavors
- Synthetic ingredients

These FDA standards are not enforced.

USDA regulates the label on meat and poultry products.



Third-party labels





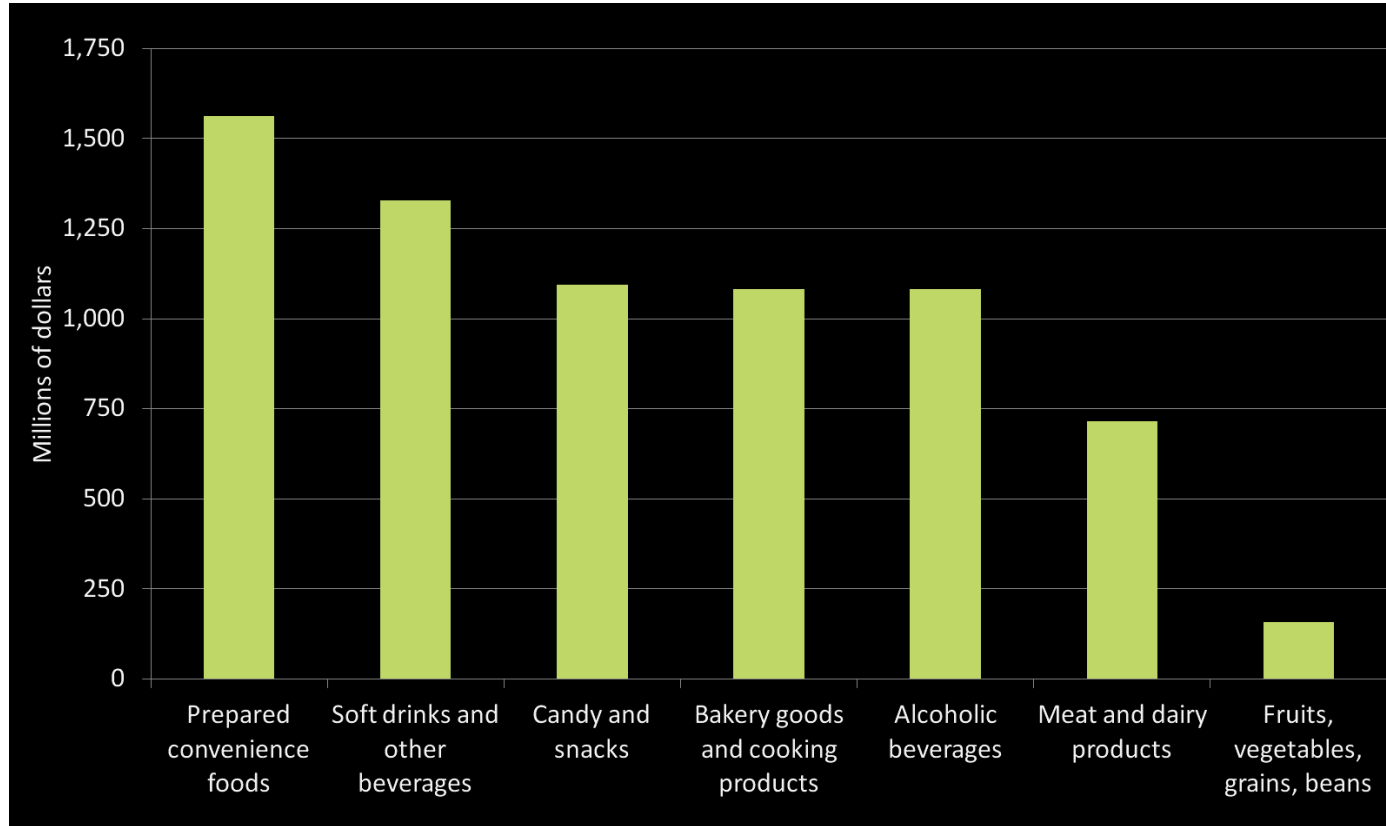
Test your brand recognition

How many companies and products can you identify based on just a piece of their logo?



All logos are trademarked and/or copyrighted.



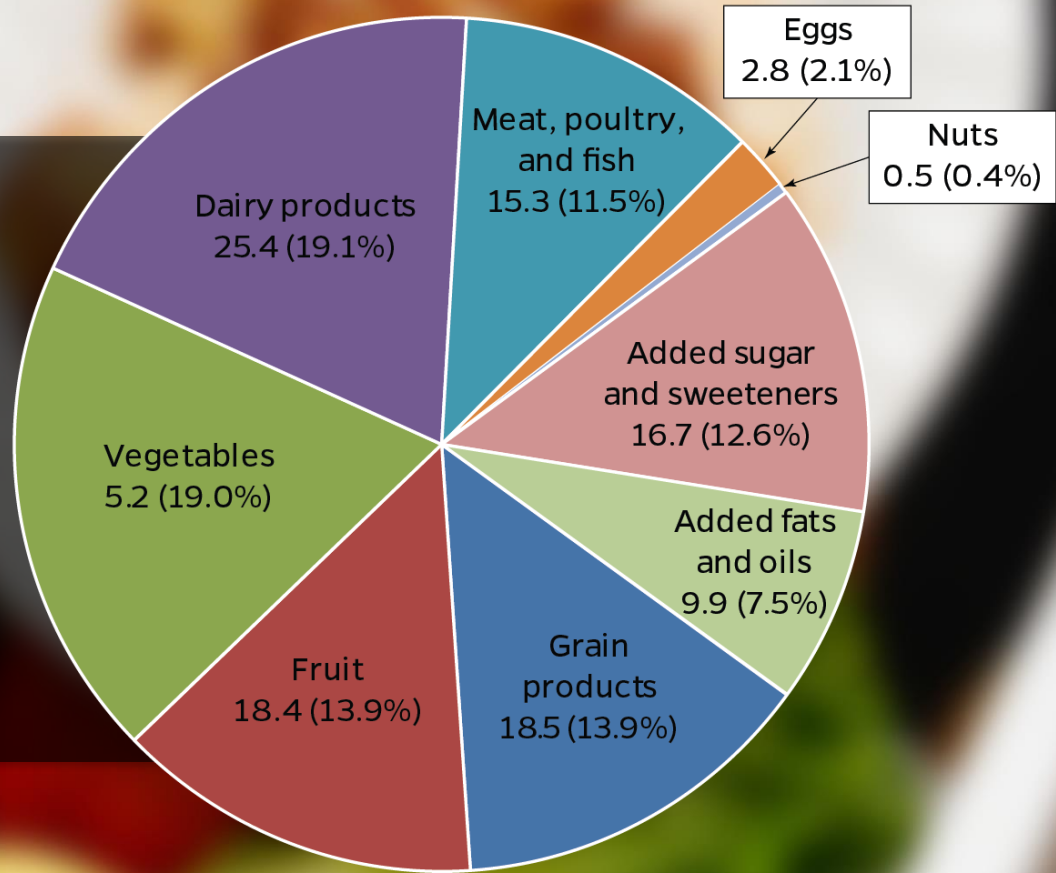


Source: Gallo A. Food Advertising in the United States. In: *America's Eating Habits: Changes and Consequences*. USDA Economic Research Service; 1999:173-180.

Waste by Food Group

U.S. food waste, in billions of pounds, 2010

Data source: Buzby JC, Wells HF, Hyman J. *The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States*. USDA ERS; 2014.



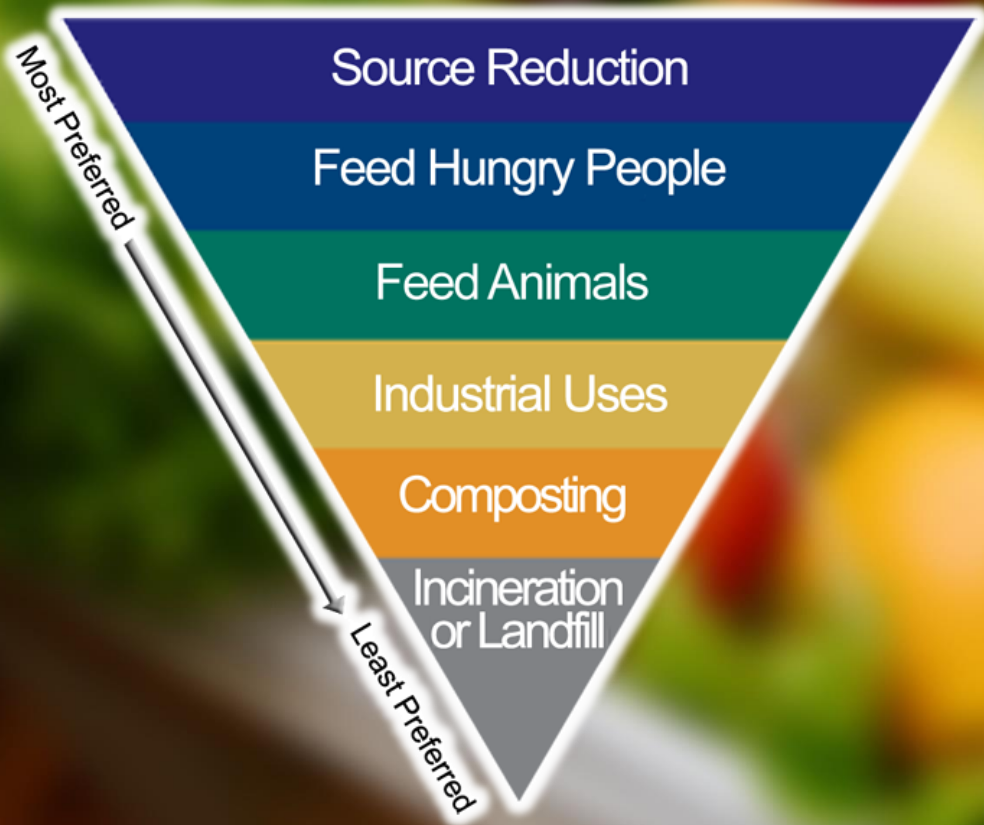
Landfills

Food represents the single largest component (21%) of solid waste in landfills and incinerators.

Source: U.S. Environmental Protection Agency.
Reducing Food Waste for Business. 2014.

Photo credit : Andrea Westmoreland, 2008. Wikimedia Commons. Creative Commons CC BY-SA 2.0 : <http://creativecommons.org/licenses/by-sa/2.0/deed.en>





Food Recovery Hierarchy

United States Environmental Protection Agency.
<https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy>