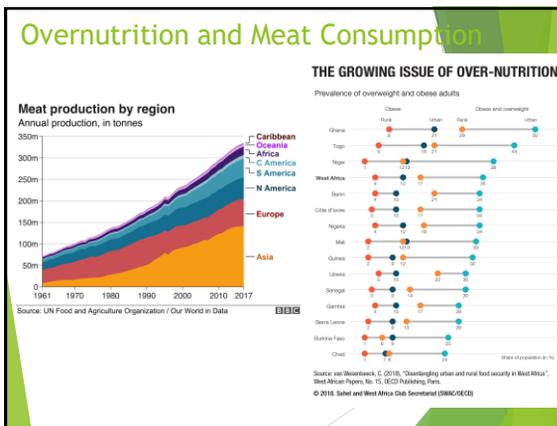
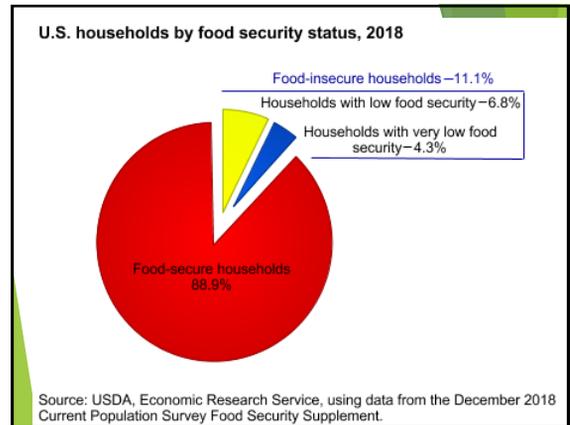
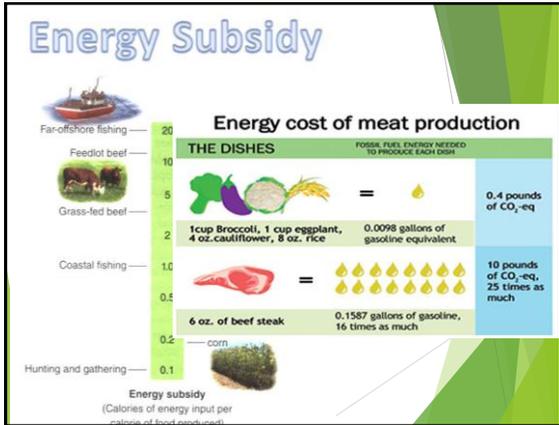




Human Nutritional Requirements

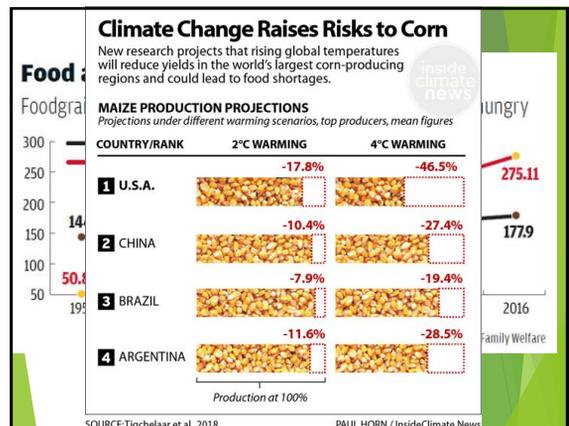
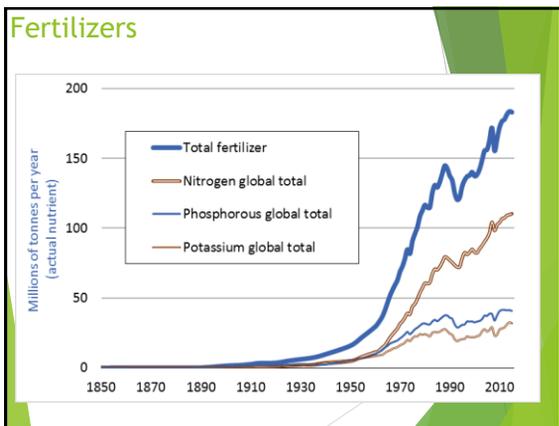
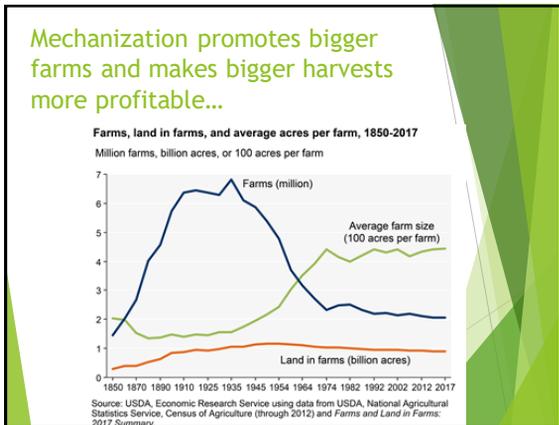
- ▶ Humans need to average 2200Kcals/day
- ▶ Approximately 12% of the world is under or malnourished
 - ▶ Numbers were worse, but had improved over the 90s and 00s. Current numbers have been increasing for the past 3 years—hunger is once again on the rise
- ▶ Host of health problems from various deficiencies
 - ▶ Vitamin A (blindness and immune suppression)
 - ▶ Iron (anemia)
- ▶ Food security is the state of having reliable access to a sufficient quantity of affordable, nutritious food





The Green Revolution

- ▶ Not as environmentally friendly as it sounds!
- ▶ Increased mechanization
- ▶ Irrigation methods
- ▶ Fertilizers
- ▶ Mono-cropping
- ▶ Pesticides
- ▶ GMOs



Monocropping

High Density Animal Farming

- ▶ Growing animals in CAFOs—concentrated animal feeding operations
- ▶ Concentrate animals in small areas to reduce costs and increase the efficiency of feeding
- ▶ Usually treat with antibiotics to prevent infections → promotes antibiotic resistance
- ▶ Manure runoff causes eutrophication

Sustainable Agriculture

- ▶ Fulfills needs for food and fiber while minimizing the use of fossil fuels, enhancing soils, and promoting economic resiliency
- ▶ Comes in many forms—some are sustainable farming practices while others involve alternative modes of production entirely
- ▶ Rodale Institute study: the planet's **3.5 billion tillable acres** could sequester nearly **40 percent of current CO₂ emissions** if they were converted to “regenerative” organic agriculture practices
 - ▶ Organic farming practices in India can increase Carbon absorption by 55% and water retention by 10%.
 - ▶ CA study found that organic farms retain 28% more C in soil than industrial farms

Sustainable agriculture integrates three main goals

- ▶ *Environmental health*
- ▶ *Economic profitability*
- ▶ *Social and economic equity.*

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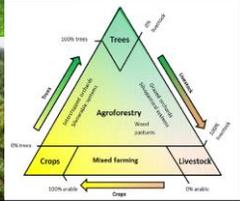
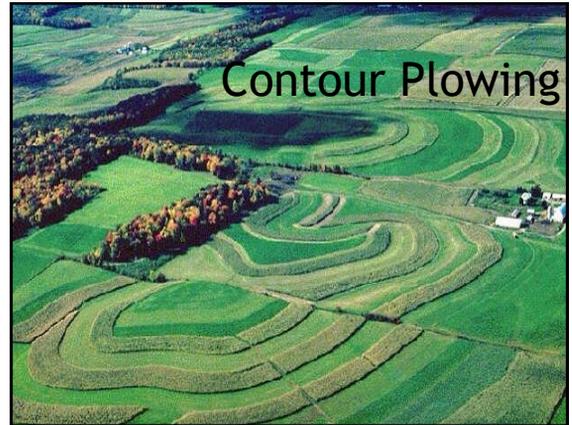


Crop Rotation

WEED OUTCOME	YEAR 1	YEAR 2	YEAR 3	YEAR 4
Poor	CORN	CORN	CORN	CORN
Fair	CORN	SOYBEAN	CORN	SOYBEAN
Better	CORN	WHEAT	SOYBEAN	WHEAT
Best	CORN	WHEAT	SOYBEAN	ALFALFA

Agroforestry



No Till Agriculture

BENEFITS OF NO-TILL FARMING

- maintains soil structure**
reduces erosion, reduces soil compaction, provides crops with the water and nutrients they need
- maintains integrity of the soil biology**
leaving leftover crop residue to break down
- fewer trips over the field**
reducing usage of fuel, labor, and tilling equipment

what is no-till?

A true no-till system avoids disturbing the soil with any kind of tool (plows, cultivators, and discs). A plow basically flips over the top layer of soil incorporating nearly all residue into the soil.

Disadvantages?

must utilize other methods to manage weeds: herbicides, herbicide resistant crops, or cover crops



Integrated Pest Management (IPM)

- ▶ Minimise pesticide application in favor of more sustainable methods
- ▶ Minimise pest exposure, THEN treat

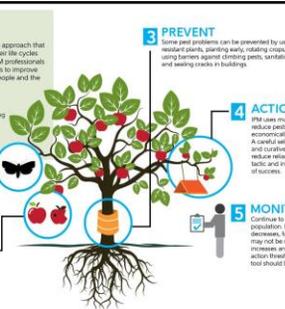



What is IPM?

Integrated Pest Management is a science-based approach that combines a variety of techniques, by studying their life cycles and how pests interact with the environment, IPM professionals can manage pests with the most current methods to improve management, lower costs, and reduce risks to people and the environment.

IPM tools include:

- Alter surroundings
- Add beneficial insects/organisms
- Crop plants that resist pests
- Disrupt development of pest
- Prevention of pest problem development
- Disrupt insect behaviors
- Use pesticides



WHERE CAN YOU PRACTICE IPM?

- Buildings and Homes:** Pests already pests, keep them out, use traps, use bait, use repellents, use natural predators.
- Farms:** Check for pest/damage early, identify economic damage, use resistant plants, use natural predators, use traps, use repellents, use natural predators.
- Managed Natural Systems:** Identify the user and use management options that have minimal risk to predators, humans, and pests.