Name: KEY

Date: _____

Class: _____

IB Environmental Systems and Societies

5.2 Terrestrial food production systems and food choices

Significant ideas:

The sustainability of terrestrial food production systems is influenced by socio-political, economic and ecological factors.

Consumers have a role to play through their support of different terrestrial food production systems.

The supply of food is inequitably available and land suitable for food production is unevenly distributed, and this can lead to conflict and concerns.

Sustainability of terrestrial food production systems

1. Outline subsistence and commercial farming.

Subsistence is low intensity, and generally no surplus. It is ~~not~~ done for the purpose of supporting a family or community. Commercial farming is for profit high intensity. It is often shipped around the world.
Subsistence is usually polyculture of both animals/crops. Commercial is usually monoculture of an animal or a crop.

2. Complete the table to compare subsistence and commercial farming:

	Commercial	Subsistence
Size/scale	large scale in # of animals or acres of monoculture	small scale with diversity.
Use in MEDC vs LEDC	mostly MEDC but some LEDC now using to produce for MEDC	usually LEDC but slowly MEDC is
Level of mechanization	highly mechanized chemical supplements low labour input	low mechanized nature oriented. high labour
Legal regulation	regulated but also have high political influence	less regulation.

3. Compare the sustainability of commercial and subsistence farming systems.

Energy

Which is more sustainable? (tick)

Commercial ☐ Subsistence ☑

Explanation:

Heavy use of fossil fuels in maintenance of farm or products used (i.e. fert.) whereas subsistence relies on human energy + natural processes.

Irrigation

Which is more sustainable? (tick)

Commercial ☐ Subsistence ☑

Explanation:

Subsistence uses more natural crops that are adapted to local climate. Commercial uses GM plants + usually annuals with shallow roots ∴ H_2O input necessary.

Indigenous crops/livestock

Which is more sustainable? (tick)

Commercial ☐ Subsistence ☑

Explanation:

Similar to above + below. Subsistence uses local crops + animals. Commercial is often not native to the area

Fertilisers and pesticides

Which is more sustainable? (tick)

Commercial ☐ Subsistence ☑

Explanation:

Subsistence relies on a systems model to help polyculture function. Much like healthy ecosystems. Commercial monocrops require fert. + pesticide to stay healthy as they are surviving outside of natures intent.

Antibiotics

Which is more sustainable? (tick)

Commercial ☐ Subsistence ☑

Explanation:

Commercial requires heavy use of antibiotics due to an intensive monoculture situation leaving animals susceptable to illness.

Pollinators

Which is more sustainable? (tick)

Commercial ☐ Subsistence ☑

Explanation:

Polycrops help encourage habitat for pollinators & not using pesticides keeps these harmful chemicals away from pollinators like bee colonies

4. Outline how the following methods could be used to increase the sustainability of food production systems:

Altering human activities

- less demand for meat
- more effort to buy local + seasonal food.
- less food waste due to poor shopping habits.

Improving food labels

- Knowing where your food comes from/how it was produced or how it was caught (seafood) could educate consumers to making more sustainable choices ∴ forcing agriculture into that direction.

Government control and monitoring

- more legislation on size of monocrops/fertilizer use/animal intensity could help encourage sustainable options at smaller scale.
- banning forest burning for agricultural land.

Creating buffer zones

- This would allow nature to play a role in agriculture. The assumption that healthy natural ecosystems might help boost agr. production. For example healthy pollinators, cleaner + more water, and healthier soils.

Food distribution and choices

1. Explain what is meant by malnutrition.

An unbalanced diet possibly caused by lack of food or even excessive food. This can result in the wrong proportion or even lack of essential nutrients.

2. According to researchers, there is enough food produced to feed everybody on the planet, yet many people in the world still live in food poverty. Using the headings below, explain why food distribution is not equal:

Climate

Some areas simply don't have the climate to allow for enough productivity. Climate change is accelerating this in some regions.

Land suitability

Arable land is limited on Earth + some regions have very poor soils. Soil degradation is accelerating the loss of suitable land for agriculture.

Cash cropping in LEDCs

LEDC countries are moving from subsistence to commercial + selling the product to MEDC countries leaving locals with less food.

Food waste in food production systems

From production → table there is waste all along way.
For instance in LEDC (ALL) parts of animal would be eaten, in MEDC we no longer do this + much of the produced animal is wasted.
Not to forget grocery store waste!

3. Compare reasons for food waste in LEDCs and MEDCs

MEDC countries have so much wealth they expect a wide variety of food at any time of year. This means there will be spoiled + wasted food due to this demand.
LEDC countries usually have food waste at the source due to ~~any~~ lack of storage possibilities. This is usually much less than MEDC waste.

4. People and societies make choices about the food they eat, and this is not always limited to what the land can produce. Outline how the following factors influence the food choices of people and societies:

Cultural and religious beliefs

Religious beliefs about food such as Hindus not eating beef or Islam not eating Pork. Culturally some areas are born eating meat or other cultural beliefs are much more prone to vegetarian.

Politics and legislation

Many governments will influence certain food production + give tax benefits. Ex. → large beef producers in U.S., palm oil in Indonesia, Dairy production in Canada.

Socio-economic factors

If agriculture is in a capitalist env. then farmers will adapt + change products depending on value of crop. Therefore following the $ and not necessarily the need of local community.

5.

a) Outline the ways in which population growth in society will decrease the availability of land for food production.

- Greater demand for food with unsustainable soil management will lead to greater degraded land ∴ reducing food prod.
- Encroachment of urban areas into arable agricultural land.
- More people = more pollution leading to negative effects on agriculture (urban smog, O_3, climate change T↑, H_2O↓)
- More people demanding inefficient production of meat.

EXTENSION:

b) Outline how population growth could **increase** food production.

(Hint: consider the technocentric/cornucopian environmental value system)

- Loss of land + increased demand could make indoor farming viable with the use of lower energy lights.
- New demand = new innovation like a new "green revolution" in genetics directly affecting the efficiency of the photosynthesis process.
- Growing meat in a biological petri dish.

Food yield, trophic levels and societies

1. Explain why producing food from livestock is generally less efficient than producing food from crops on the same land

We must grow crops to feed livestock. Simply 2nd law of thermodynamics leads to energy loss as the grain is consumed by cattle. 100 kg of grain produces 10kg of beef.

2. Explain why harvesting food from lower trophic levels may be more **cost** efficient.

As stated above there is less wasted energy as it doesn't pass through multiple trophic levels.

3. Outline reasons why members of a society may tend to harvest from higher tropic levels despite the limitations in efficiency.

Animals have been part of societies long before crops ∴ tradition carries through. Meat consumption can be a level of economic status. Education that meat is needed to be strong + healthy.

Comparing food production systems

1. Conduct your own research into two specific terrestrial food production systems, preferably one that is present in your own country and one that isn't, if possible.

Compare these food production systems using the table below.

from Vice video "meathooked"

	Food production system 1: Brasil Beef production (U.S)	Food production system 2: Polyculture farm (U.S.)
Inputs	• antibiotics, pesticides, fert. • grown feed • high energy • high water	• human labour • field grasses • natural systems • lower water use
Outputs	• degraded land • eutrophied water • high chemical meat	• healthy natural env. • high biodiversity • healthy, low chemical meat
System characteristics (e.g. diversity, sustainability)	Monoculture, distinct & disconnected. Grassland grown / cut / fed to animals in barn.	Polyculture. Functions on system, interconnected. Cattle feeding on grassland / grassland fertilized by manure with help from chickens.
Environmental Impact	High impact, degraded soils, low biodiversity, increase eutrophication of H_2O due to high conc. of nutrients from waste.	Low impact, high diversity remains. Crops are perennial with lower H_2O demand
Socio-economic details (e.g. subsistence or cash crop, for export or local use...)	low labour, high use of technology & chemicals produces meat at a low $ to consumers.	higher labour + lower meat production per acre = more expensive product