A field of corn contains a certain amount of food energy. If cattle eat the corn, they will gain some of the food energy. How does the amount of energy in the corn compare with the amount of energy in the cattle? Is it more efficient for people to feed on corn or beef? In this activity, you will compare the energy content of some familiar human foods.

Problem

How do the energy content of some familiar human foods compare?

Materials

- graph paper/program
- calculator
- pencil crayons
- ruler

Procedure

1. MAKE A BAR GRAPH {10 marks}
   The table lists the average amount of energy (in kJ/m^2/year) in different organisms that people use for food. Make a bar graph to compare the relative amounts of usable energy produced by each organism. On your graph be sure to arrange the organisms in terms of least energy produced to most produced (from left to right). In addition, use different colours to identify the producers and the consumers (animals and their products).

2. COMPLETE THE CHART {4 marks}
   Assume that 800 kJ of each organism is consumed in one meal. Calculate the area of land needed (4th column) to produce 800 kJ of each organism per year. For example, rice yields 5200 kJ/m^2/year. To produce 800 kJ of rice then 800/5200 or 0.15 m^2 of land is required. Record your results (to 2 dec. places) in the table provided.

Questions

{2} 1. Calculate the total average energy (kJ/m^2/year) for (a) the producers, and (b) the consumers. Express your answers as whole numbers.

{2} 2. How does the total average energy (kJ/m^2/year) for the producers compare with that of the consumers? Suggest an explanation for this.

{2} 3. Would you say that plants vary a little or a lot in their efficiency at producing food energy for human consumption? Suggest reasons for the variation.

{2} 4. In most cases, is it more efficient for people to eat plant products or animal products? Why?

{3} 5. The Earth could support a much larger human population if everyone became a vegetarian. Explain what is meant by this statement with respect to what you have discovered from this lab.

TABLE:
Energy Produced by Different Organisms & The Area of Land Needed to Produce 800 kJ of Each Organism

	Organism	Energy (kJ/m^2/year)	Land Needed (m^2)
PRODUCERS	wheat cereal	3 400	
	oranges & grapefruit	4 200	
	peanut butter	3 850	
	rice or rice cereal	5 200	0.15
	potatoes	6 700	
	carrots	3 400	
	other vegetables	840	
	apples	6 300	
	peaches and pears	3 800	
	beet sugar	8 300	
	cane sugar	14 650	
	corn cereal	6 700	
CONSUMERS	milk	1 800	
	eggs	840	
	chicken	800	
	pork	800	
	beef (feedlot)	550	
	fish fillets	8	

NOTE: 1 kJ = 1000 J