

LESSON 2: FOOD WEBS & ENERGY TRANSFER

Objectives

- × Describe a food chain
- × State how energy is 'lost' from a food chain
- × Calculate energy efficiency

Success Criteria

- × You can construct a food web
- × You can suggest where energy is 'lost' from a food chain
- × You can calculate energy efficiency (Higher)

TO START..

- ✘ Watch the video clip and write down 6 or more key points



<http://www.youtube.com/watch?v=3Bn7wdCP2v4>

KEY POINTS IDENTIFIED IN FILM

- Energy from photosynthesis
- Food chains make up webs
- Plant eaters feed on grass – help more grass grow back in its place
- Each predator has own techniques for hunting prey
- Cheetahs run fast, lions slower – more sneaky
- Predators can work together but often compete
- Hyenas and cheetahs are competitors – attack each others cubs and steal food - - predators can become scavengers
- Large animals use up energy at slower rate therefore can go longer without food
- Food chain always starts as photosynthesis and ends in decay

MAKE YOUR OWN FOOD WEB...3 MINS

- ✦ Construct a food web using the organisms below:



Hawk



Grass



Slug



Lettuce

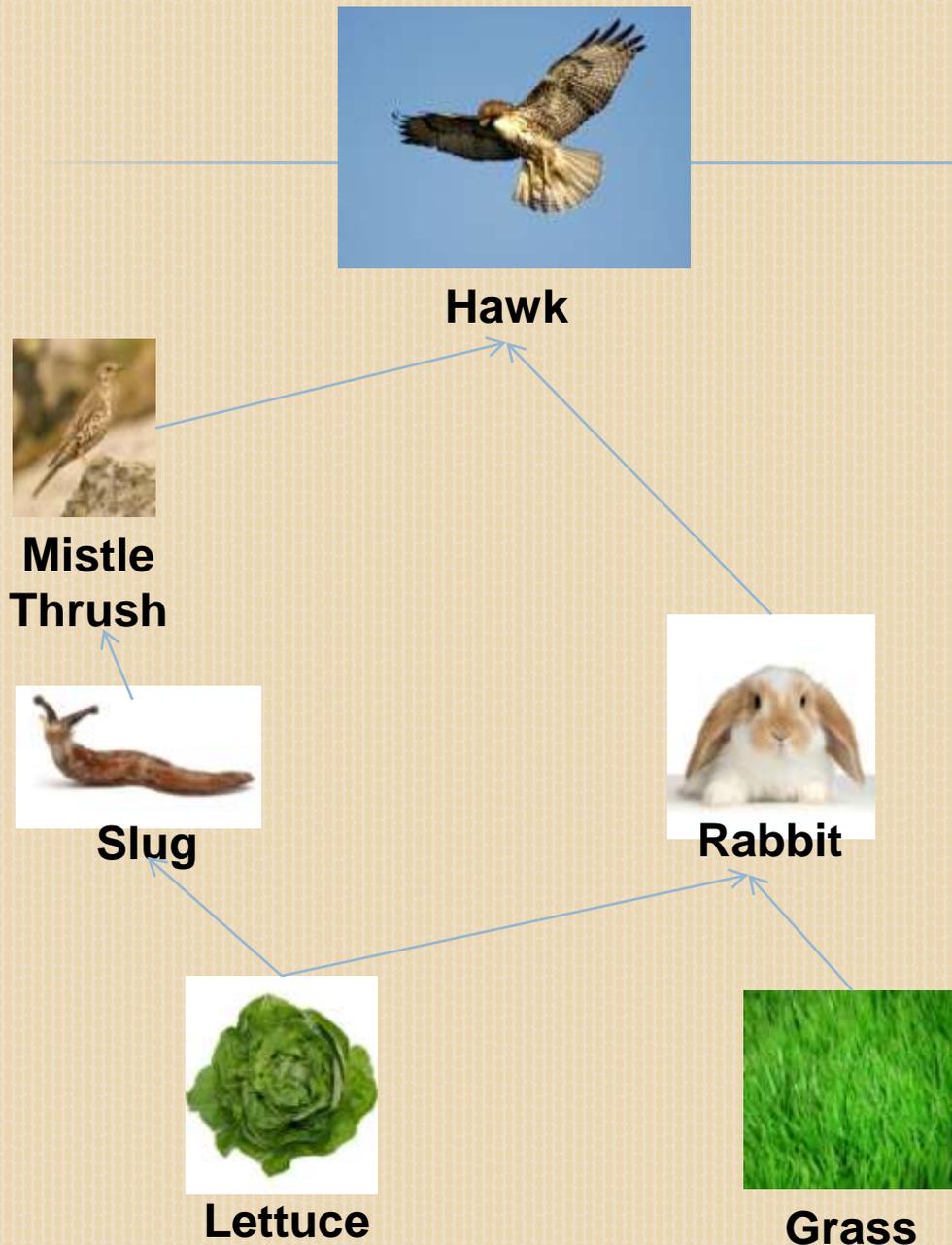


**Mistle
Thrush**



Rabbit

What might happen if:



a) There was a disease of rabbits that killed off a large part of the rabbit population?

b) It was a year with exceptional sunshine and rain which meant that there was an extra large crop of lettuces and grass

Copy questions into books
– then discuss in pairs
– 5 minutes.

ENERGY LOSS

- × How is energy 'lost' in food chains?
 - + From plants: evaporation
 - + From animals: movement, heat loss, waste
- × How much is lost?
 - + As much as 90% between each trophic level
 - + 100kg of grass *provides enough energy for* 10kg of rabbits **which provides enough energy for** 1kg of fox

CALCULATING ENERGY EFFICIENCY (HIGHER)

Energy efficiency can be calculated using the following equation:

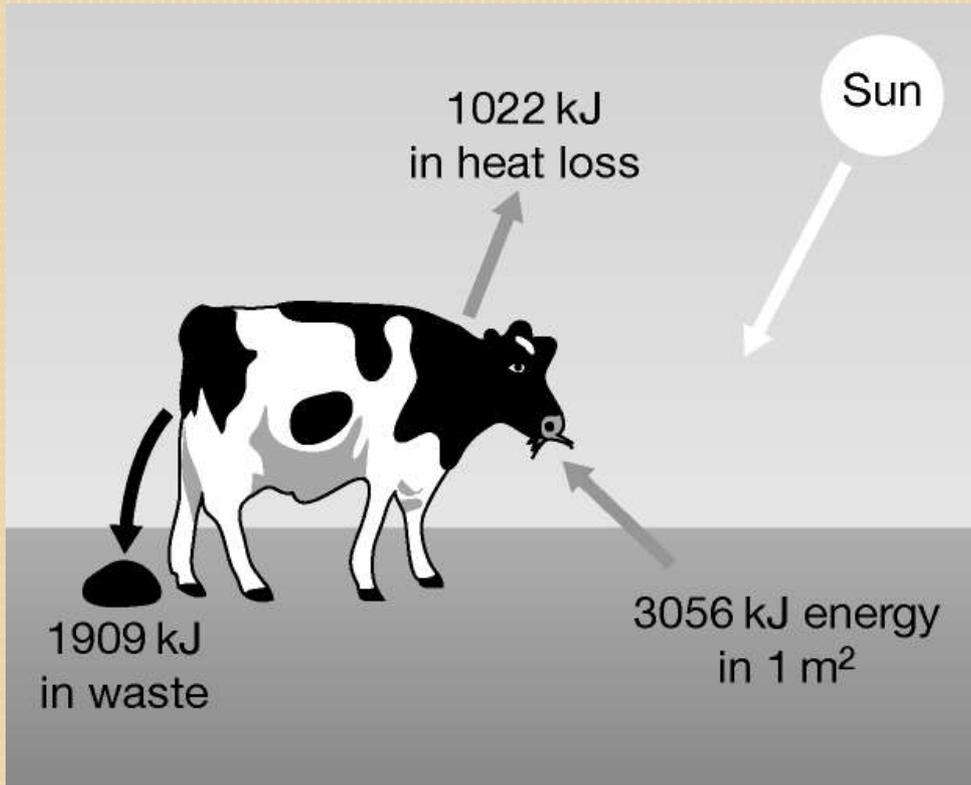
$$\text{efficiency} = \frac{\text{energy used for growth (output)}}{\text{energy supplied (input)}}$$

For example, if grass receives 1,000,000 kJ of energy from the Sun and uses 20,000 kJ of energy for growth, then:

$$\begin{aligned}\text{efficiency} &= \frac{20,000 \text{ kJ}}{1,000,000 \text{ kJ}} \\ &= 0.02 \quad \text{or} \quad 2\%\end{aligned}$$

What conclusion would you draw about the efficiency of energy transfer from the sun to grass?

COPY & ANSWER THE QUESTIONS:



1) Calculate the percentage of energy lost in urine, faeces and heat loss.

2) What is the energy efficiency of the energy conversion in a cow?

3) Explain why there is better energy efficiency when cows are kept in sheds?

Higher question if you finish:

4) A rabbit consumes 1500 kJ of energy from eating grass. Only 4% is used for growth. Calculate the amount of energy available to the secondary consumer

Foundation level:
Answer q.9 & 10 on
p.61

ANSWERS

- × **Q1** $(1022 + 1909) \div 3056 = 0.959$ convert into a percentage by multiplying by 100 = 96%
- × **Q2** Efficiency = energy used \div energy supplied $\times 100 = 125 \div 3056 \times 100 = 4\%$
- × **Q3** There is less heat loss and less energy used for movement.
- × **Q4** 60kj (0.04×1500)

PLENARY

× Discuss in pairs (3 minutes):

- 1) Suggest why free range eggs are more expensive than eggs from battery hens
- 2) Suggest why being vegetarian is more energy efficient?