## Community Ecology Problems & Study Questions
**Conservation Biology – Biology 114**
**Spring 2009**

1. Using a bomb calorimeter, you determine the following energy values:

| Source | Energy content (kJ/g) |
|---|---|
| Plant material in herbivore's diet | 16 kJ/g |
| Energy stored in average cells of the Herbivore's body | 20 kJ/g |
| Energy stored in herbivore's feces and in other compounds released from its body | 10 kJ/g |
| Energy use by the herbivore during the study time. | |

Suppose the herbivore eats 20 g of plant during the study period. The herbivore's dry weight increases by 2.3 g during this time.
(a) What was the dry weight of feces and other released compounds during this time?
(b) How much energy entered the herbivores body in the food it ate during the study?
(c) How much energy left the herbivore's body as undigested or discarded matter?
(d) What is the ecological efficiency of the herbivore?

2. Suppose that 100,000,000 Joules of sunlight is captured by producers per hectare of land. Furthermore, suppose that the ecological efficiency of moving up each rung of a food chain in this place is 10%. Finally, suppose the following energy requirements:

| Trophic level | Average energy requirement (J) |
|---|---|
| Average herbivore | 10 |
| Average primary carnivore | 20 |
| Average secondary Carnivore | 50 |
| Average tertiary Carnivore | 100 |
| Quaternary Carnivore | 1000 |

Based on the given ecological efficiency, how much energy is theoretically available to each level of this food chain?
How many levels can be sustained with this much primary production? (Hint – you will not be able to sustain all).
What does this mean about ecosystem structure?
Beyond energy -- what does this illustrate about pyramids of biomass and numbers?