2. In winter the produce is protected from freezing. The specific heat of Earth is so high that soil freezes only to a depth of a few inches in temperate regions. Throughout the year the temperature will stay nearly constant day and night. Factors to be considered are the insulating properties of the soil, the absence of a path for energy to be radiated away from or to the vegetables, and the hindrance of the formation of convection currents in the small, enclosed space.

4. The high thermal capacity of the barrel of water and its high heat of fusion mean that a large amount of energy would have to leak out of the cellar before the water and produce froze solid. Evaporation of the water keeps the relative humidity high to protect foodstuffs from drying out.

6. Yes, if you know the specific heat of zinc and copper, you can determine the relative fraction of each by heating a known weight of pennies to a specific initial temperature, say 100° C, then dump them into a known quantity of water, at say 20° C. The equation for conservation of energy will be

$$m_{pennies} \left[x \cdot c_{Cu} + \left(1 - x \right) c_{Zn} \right] \left(100°C - T \right) = m_{water} c_{water} \left(T - 20°C \right)$$

The equilibrium temperature, T, and the masses will be measured. The specific heats are known, so the fraction of metal that is copper, x, can be computed.

8. Write $m_{water} c_{water} \left(1°C \right) = \rho_{air} V c_{air} \left(1°C \right)$, to find

$$V = \frac{m_{water} c_{water}}{\rho_{air} c_{air}} = \frac{\left(1.0 \times 10^3 \text{ kg} \right) \left(4\ 186 \text{ J/kg} \cdot °C \right)}{\left(1.3 \text{ kg/m}^3 \right) \left(1.0 \times 10^3 \text{ J/kg} \cdot °C \right)} = 3.2 \times 10^3 \text{ m}^3$$

10. The black car absorbs more of the incoming energy from the Sun than does the white car, making it more likely to cook the egg.

12. Keep them dry. The air pockets in the pad conduct energy slowly. Wet pads absorb some energy in warming up themselves, but the pot would still be hot and the water would quickly conduct a lot of energy to your hand.