CASE

Curriculum for Agricultural Science Education

# Principles of Agricultural Science – Animal

# Cell Respiration

Unit 4 – Lesson 4.1 Units of Life

# Metabolism

Metabolism is the combination of many physical and chemical processes in living cells by means of which energy is made.

# Cellular Respiration

One metabolic process commonly associated with cells is respiration.

Living things use energy produced through respiration to drive vital life processes, such as growth and reproduction.

# Cellular Respiration Defined

- A chemical process that takes place in living cells
- Food is “burned” to release energy and waste products
  - Food = fats, carbohydrates, and proteins
  - Waste products = carbon dioxide and water

# Types of Cellular Respiration

- **Aerobic** – Occurs in the presence of oxygen

  e.g., living plants and animals

- **Anaerobic** – Occurs in the absence of oxygen

  e.g., fermentation of plant tissue and components

# Respiration is similar to combustion…

When a log is burned in the fireplace carbon dioxide, heat, and water are produced.

**Heat**

**$CO_2$**

**$H_2O$**

# With respiration…

Carbohydrates, such as sugars are “burned” in the animal cells.

$$C_6H_{12}O_6 + 6H_2O + 6O_2 \rightarrow 6CO_2 + 12H_20 + \text{energy}$$

Glucose (sugar) + Water + Oxygen → Carbon Dioxide + Water + Energy

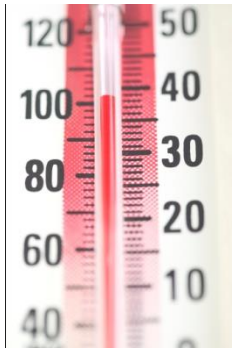
The result is the release of carbon dioxide, water, and energy.

# Factors Affecting the Rate of Respiration

- ✓ Temperature
- ✓ Level of oxygen
- ✓ Use of energy

# Temperature

The rate of respiration increases as the temperature increases.




Temperature

Respiration Rate

# Oxygen and Energy

Animals use energy by walking, running, digesting food, and so forth.

The more exercise or metabolic functions animals experience, the more cells respire to provide energy for body functions.

# Animal Hibernation

- Slows metabolism and body functions down

- This is essentially slowing cell respiration to the minimum level for sustaining life.

# References

Herren, R. V., & Donahue, R. L. (2000). *Delmar's agriscience dictionary with searchable CD-ROM*. Albany, NY: Delmar.

Parker, R. (2004). *Introduction to plant science* (Rev. ed.). Clifton Park, NY: Delmar.