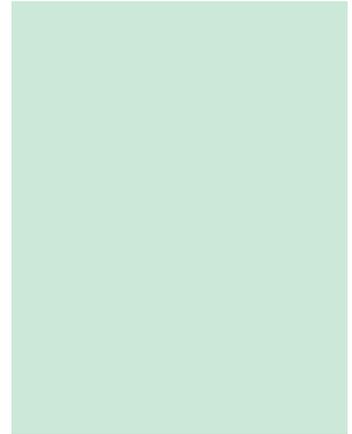


Animals Unit

Week 2 – What happens to food when it is consumed?

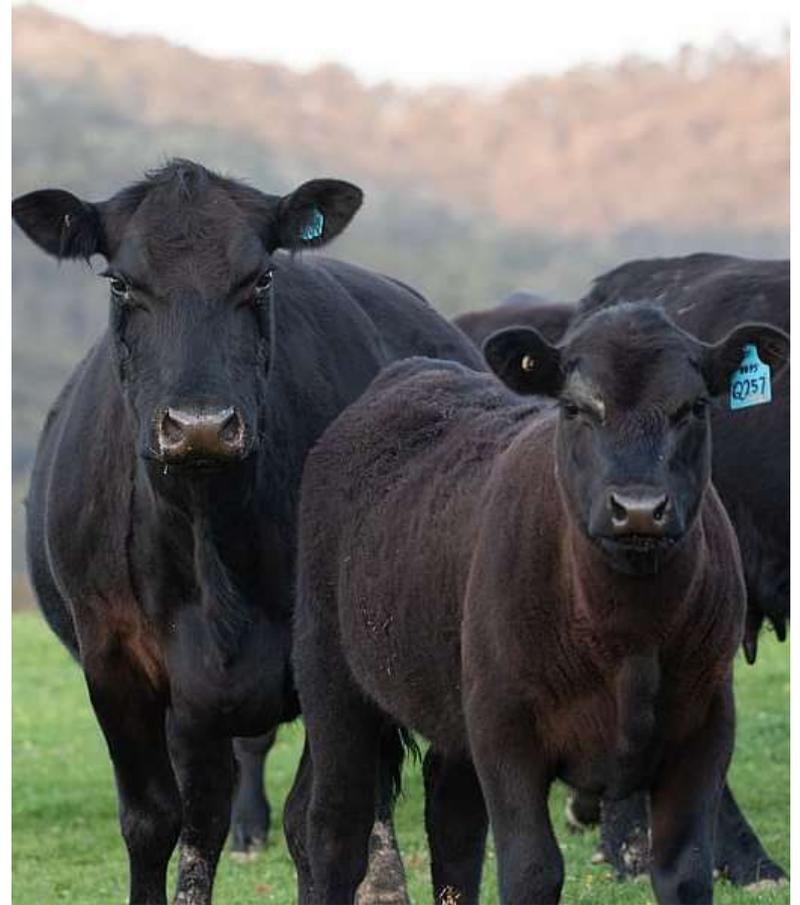


Waterford Biology



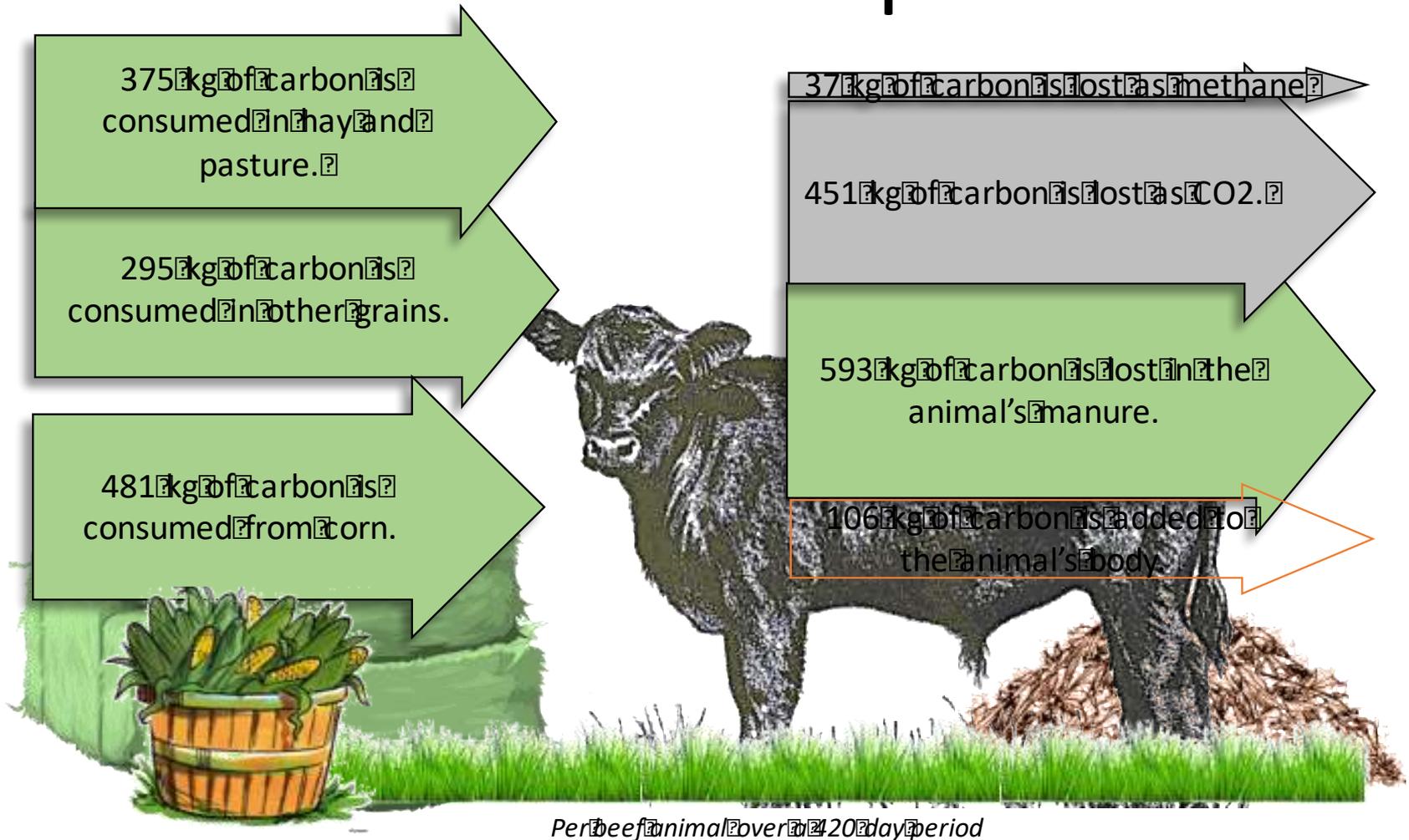
Animals Unit - W2 Driving Question

- This week's driving question: What happens to food when it is consumed?
 - What happens to the atoms found in food molecules?
 - How is what an animal breathes out related?
 - Do those atoms become a part of the animal that consumed the food?



Source: <https://www.pxfuel.com/en/free-photo-xiudk>

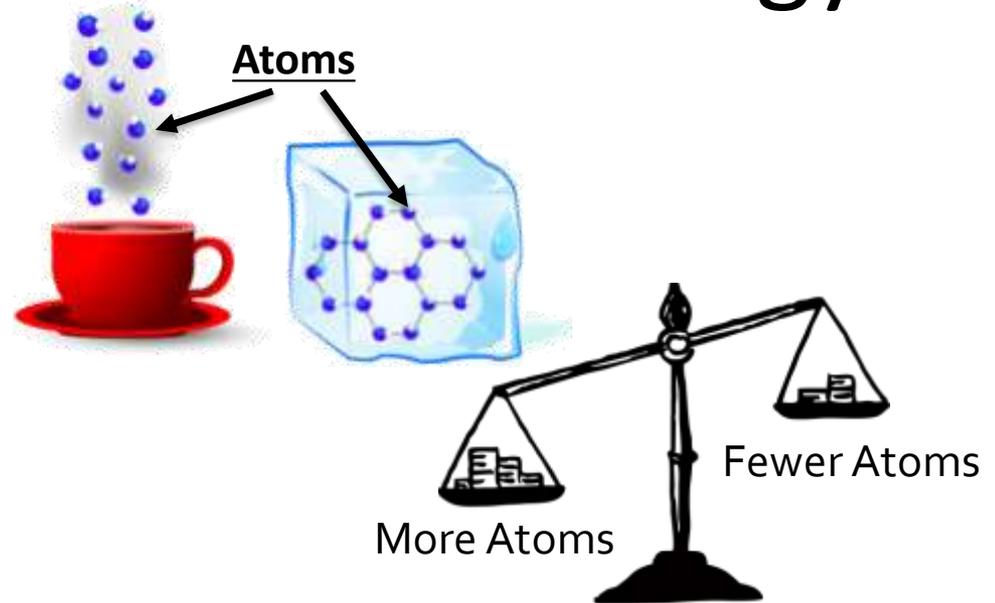
Part 1 Recap



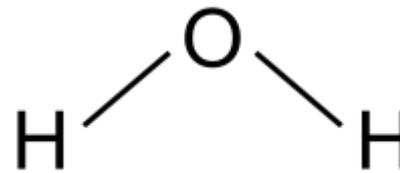
- What claims can we make based on the data above?

Reminders from Matter & Energy

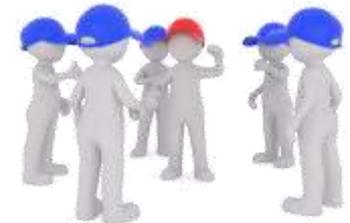
- Rule #1: All solids, liquids, and gases are made of tiny particles called atoms.
 - The more atoms something has, the more mass it has.
 - Multiple atoms can bond together to form molecules.
 - For example, water molecules consist of 1 oxygen atom and 2 hydrogen atoms.



If atoms were like students, a class would be like a molecule.



A group of bonded atoms = a molecule.

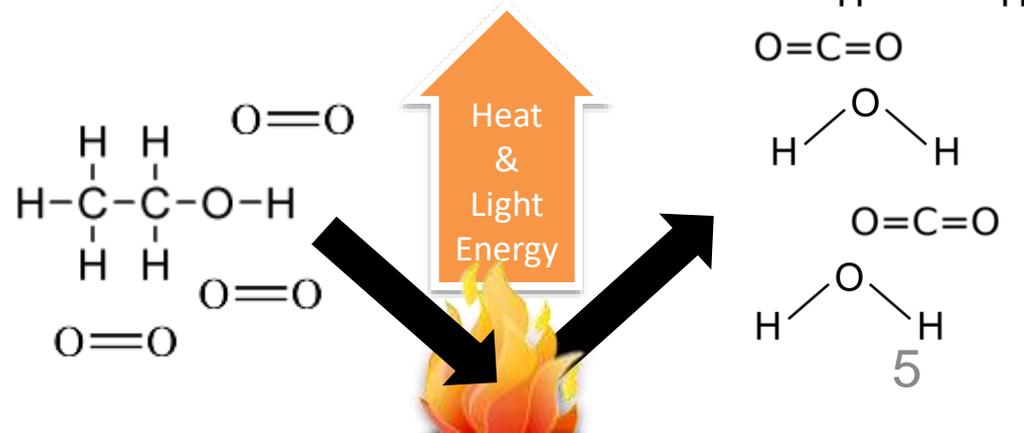
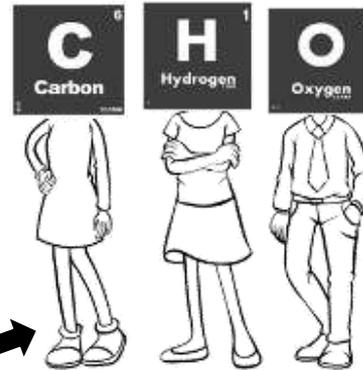


A group of students = a class.

Reminders from Matter & Energy

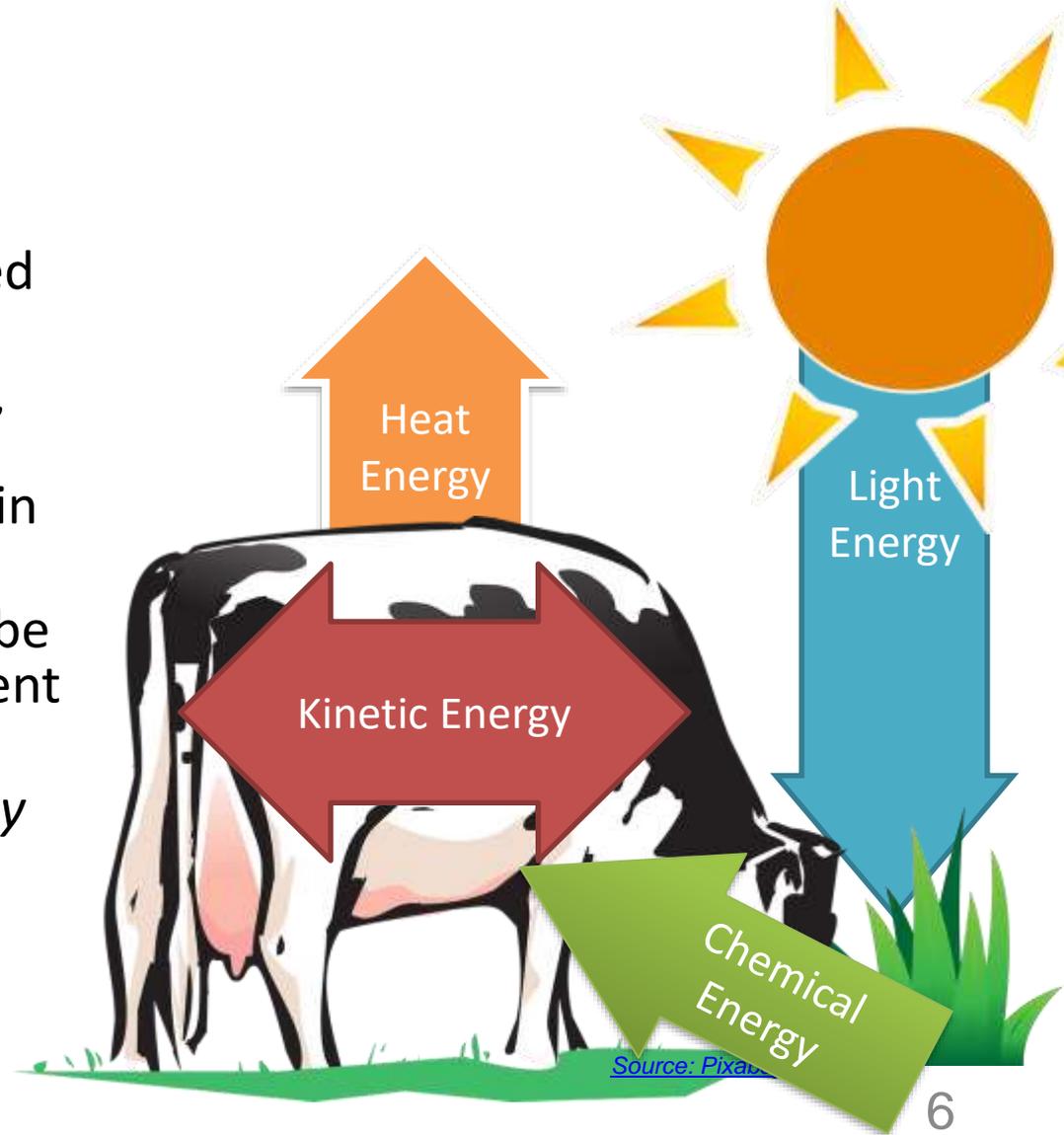
- Rule #2: In biology, **atoms last forever.**
 - Atoms cannot be created or destroyed.
 - *For example, a carbon atom is always a carbon atom).*
 - Different kinds of atoms are called *elements*.
 - Atoms found on one molecule can be rearranged to form a new molecule →

FOREVER
Atoms



Reminders from Matter & Energy

- Rule #3: In biology, **energy lasts forever.**
 - Energy cannot be created or destroyed.
 - Energy can exist as light, heat, motion, or as chemical energy stored in the bonds of molecules.
 - Energy in one form can be transferred into a different form.
 - *For example, light energy can be transformed into heat energy.*



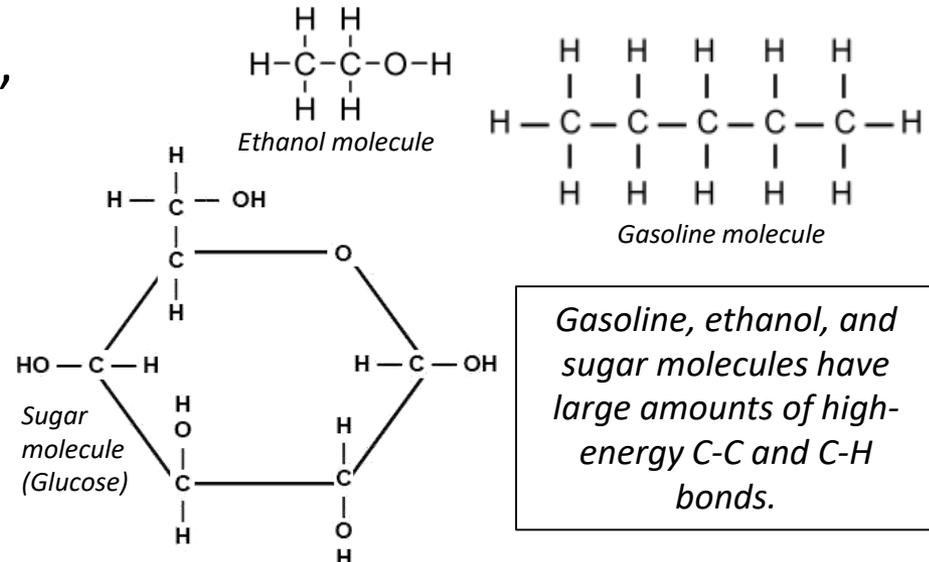
Chemical bonds = stored energy

- **When atoms form molecules, they store energy in their chemical bonds.**
 - Bond energy is the strength of a chemical bond.
- **Carbon-carbon bonds and carbon-hydrogen bonds are high-energy bonds.**
 - The more C-C and C-H bonds, the higher the chemical energy.
 - This is why sugars like glucose can provide large amounts of energy.

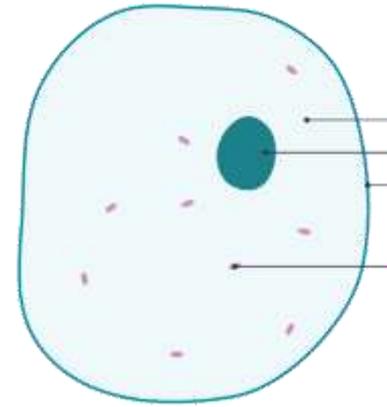


Nutrition Facts		Amount/serving	%DV*	Amount/serving	%DV*
Serving Size 1 Bar		Total Fat 13 g	21%	Total Carb. 25 g	8%
Calories 230		Sat. Fat 9 g	43%	Dietary Fiber 1 g	4%
Fat Cal. 120		Cholest. 10 mg	3%	Sugars 22 g	
*Percent Daily Values (DV) are based on a 2,000 calorie diet.		Sodium 40 mg	2%	Protein 3 g	
		Vitamin A 0% • Vitamin C 0% • Calcium 8% • Iron 2%			

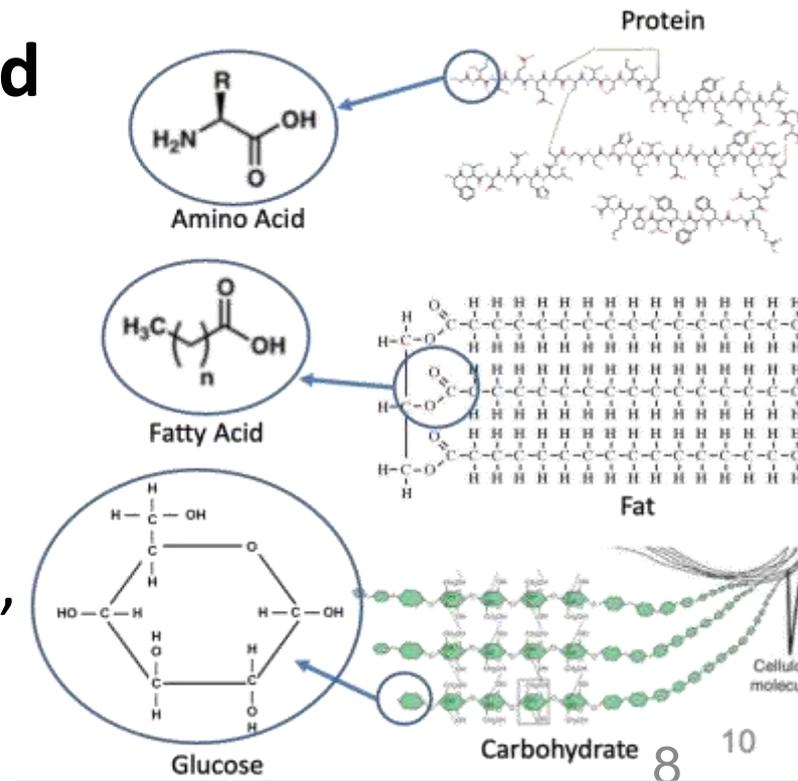
Chocolate has large amounts of chemical energy (measured in calories) stored in the C-H and C-C bonds of its sugar & fat.



Introduction to Cells

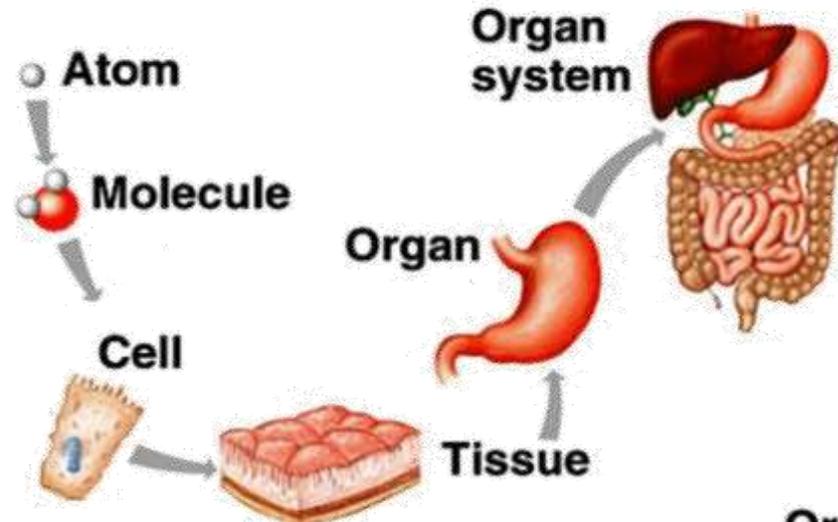


- **Cells are basic building blocks of life.**
 - Cells are the smallest thing that can be alive.
 - Anything that is alive is comprised of cells.
- **Atoms from food are organized into macromolecules.**
 - A macromolecule is a long chain of bonded molecules.
 - Macromolecules do the work of cells.
 - Examples include carbohydrates, proteins, and fats.



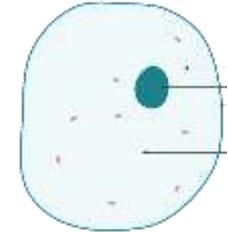
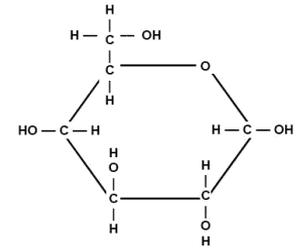
Reminders from Animals Week 1

- **Organelles are structures within cells that perform specific functions.**
 - Organelles consist of a combination of membranes and proteins (sort of like tiny cells within cells).
 - Examples of organelles include the mitochondria, nucleus, and chloroplasts.
- **A group of similar cells forms tissue.**
 - Organs are comprised of multiple kinds of tissue.
 - Systems are comprised of organs with a similar function.

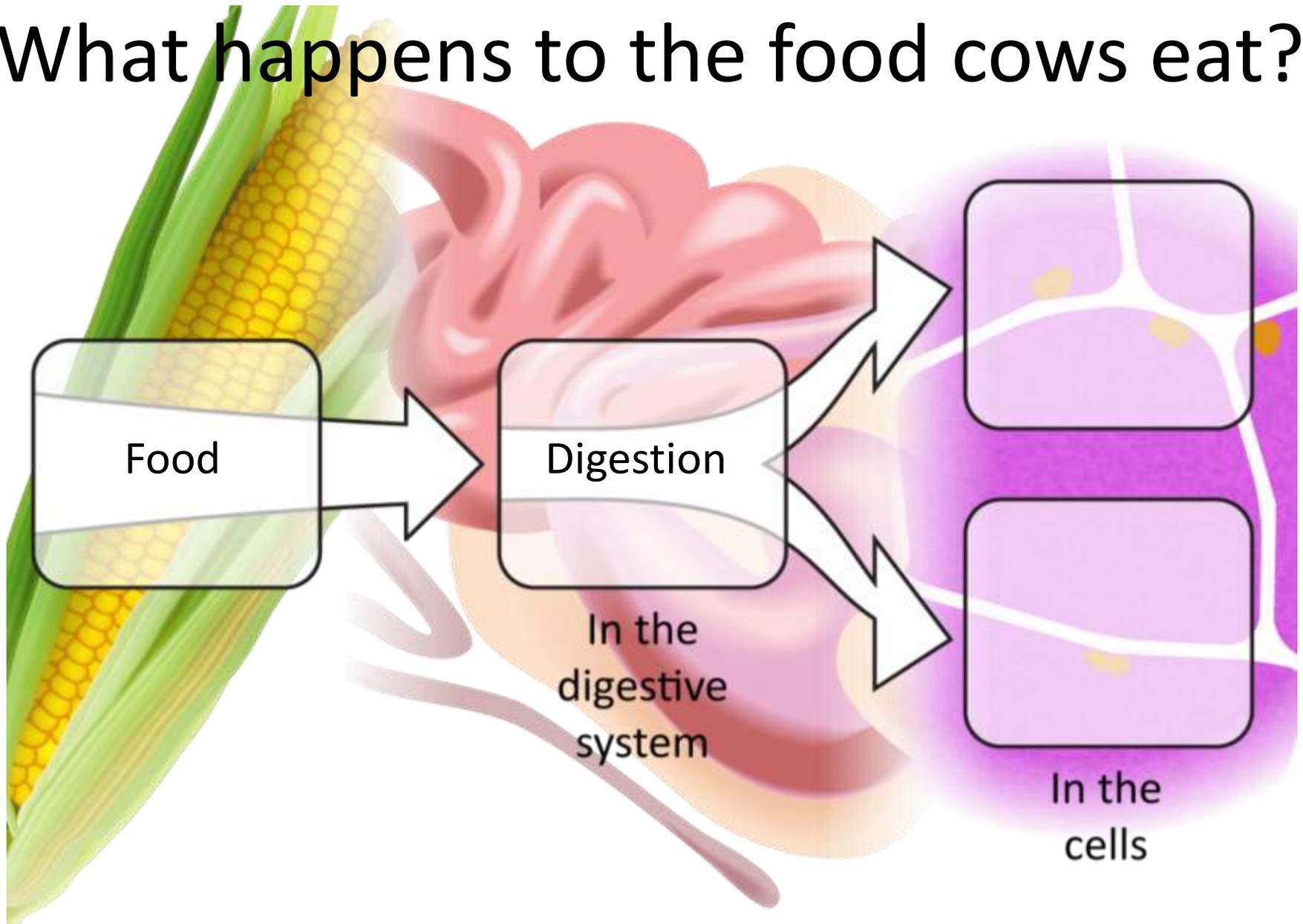


Reminders from Animals Week 1

- **We will investigate biological phenomena at four different levels.**
 - Atomic-molecular: how atoms are rearranged to form new molecules, and how energy is transformed from one kind to another.
 - Cellular: the processes that occur within cells to move matter and transform energy.
 - Organismal: how individual animals, plants, fungi, and bacteria function, survive, and reproduce.
 - Ecosystem-planetary: how living organisms interact with non-living resources, causing changes across large areas of the planet.

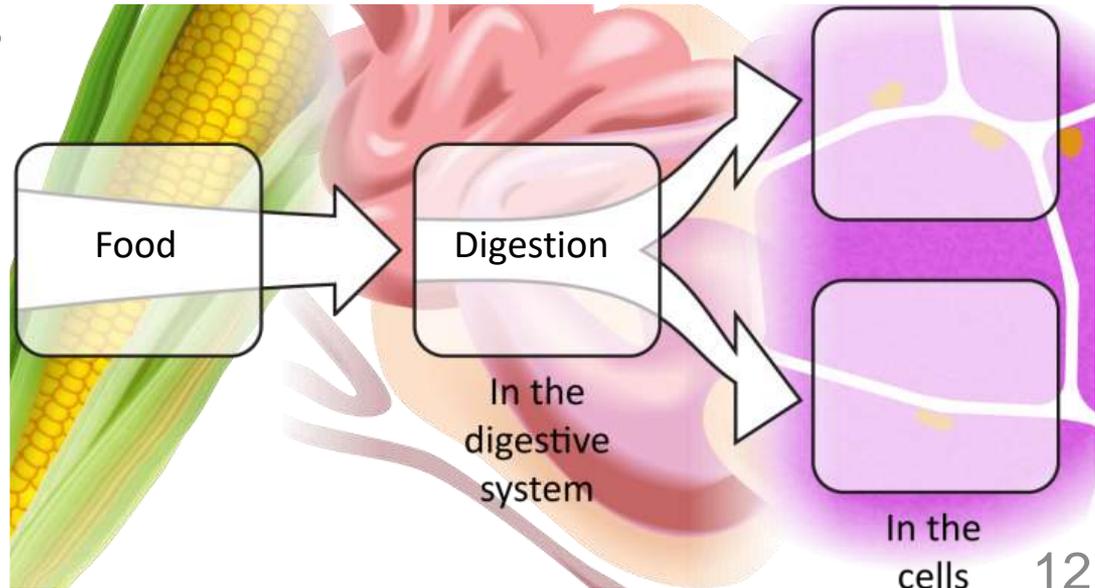


What happens to the food cows eat?



What happens to the food cows eat?

- **Consumed food is first broken down into smaller and smaller pieces.**
 - This occurs in the digestive system (mouth, stomach, and intestines).
 - Animals can use physical processes (such as chewing) and chemical processes (such as digestive enzymes) to break food into smaller and smaller particles.

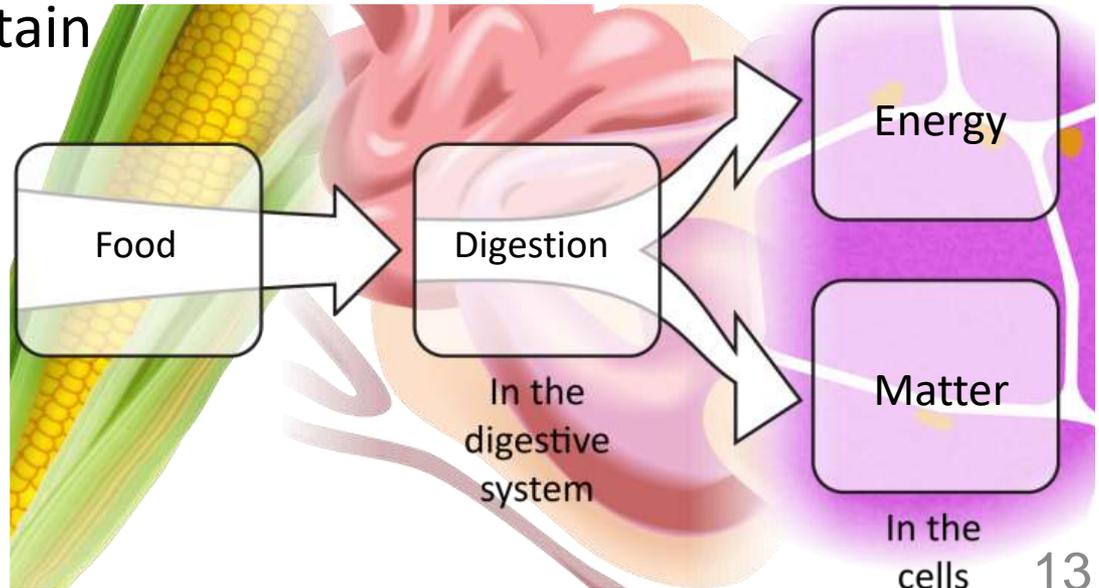


What happens to the food cows eat?

- **The food that animals consume services two primary purposes – matter or energy.**

- 1) Food can provide an animal with the energy it needs to function. High-energy foods have lots of C-C and C-H bonds.

- 2) Food can provide matter (the atoms) that animals need to create and maintain their cells (*all the mass of an animal comes from the food they eat*).



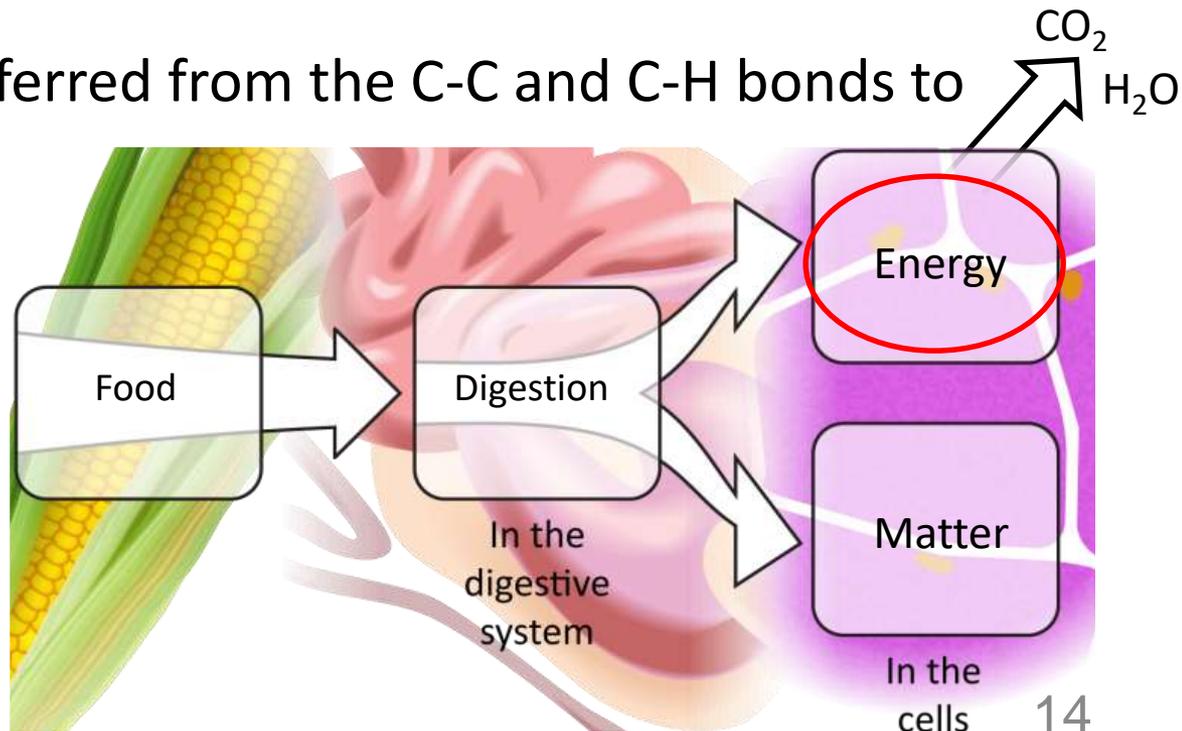
What happens to the food cows eat?

- **Most of the time, consumed food is used for energy.**

- In these circumstances, the atoms in the food and oxygen (O_2) are rearranged into carbon dioxide (CO_2) and water vapor (H_2O).

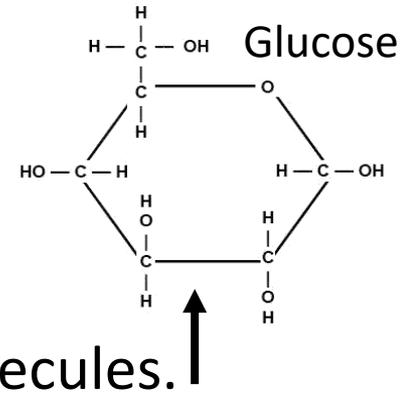
- The energy is transferred from the C-C and C-H bonds to the animal's cells.

- Roughly 90% of consumed food is used in this way.

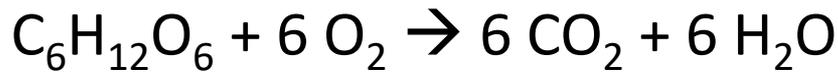


Rearranging Atoms in Food

- For example, corn is mostly comprised of carbohydrate macromolecules.

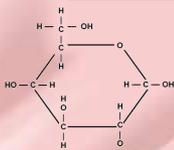
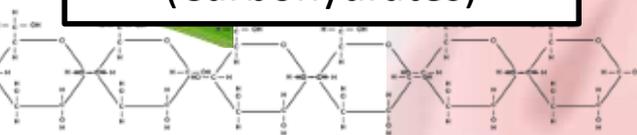


- Enzymes in a cow’s digestive tract break down long chains of glucose into individual glucose molecules.
- These molecules enter the bloodstream and travel to cells.
- The cow’s cells can rearrange glucose and oxygen molecules into carbon dioxide and water molecules.

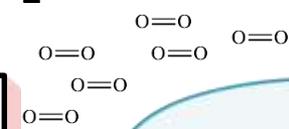


Digestive Tract

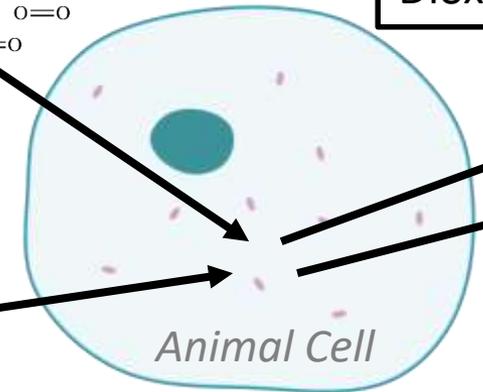
Long Chains Of Glucose
(Carbohydrates)



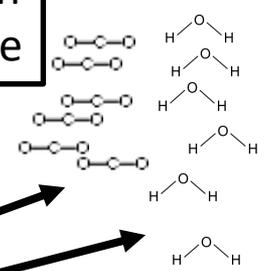
Oxygen



Glucose



Carbon Dioxide

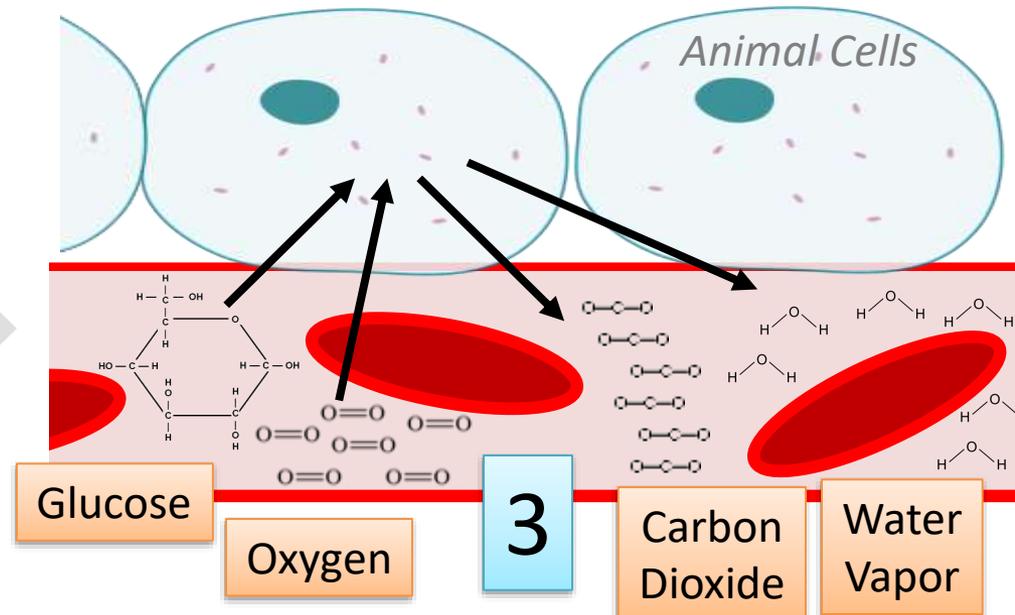
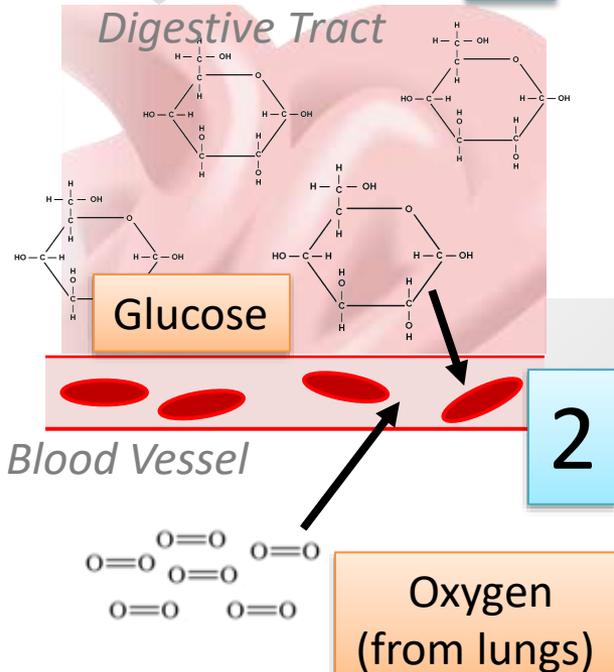
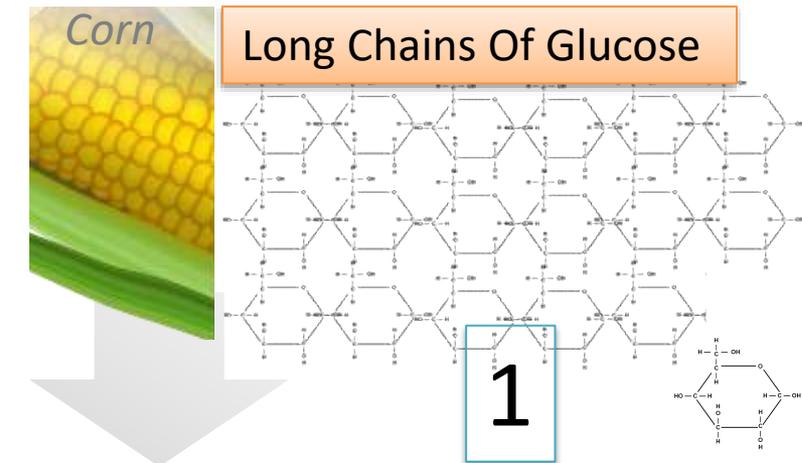


Water Vapor

Animal Cell

Rearranging Atoms in Food

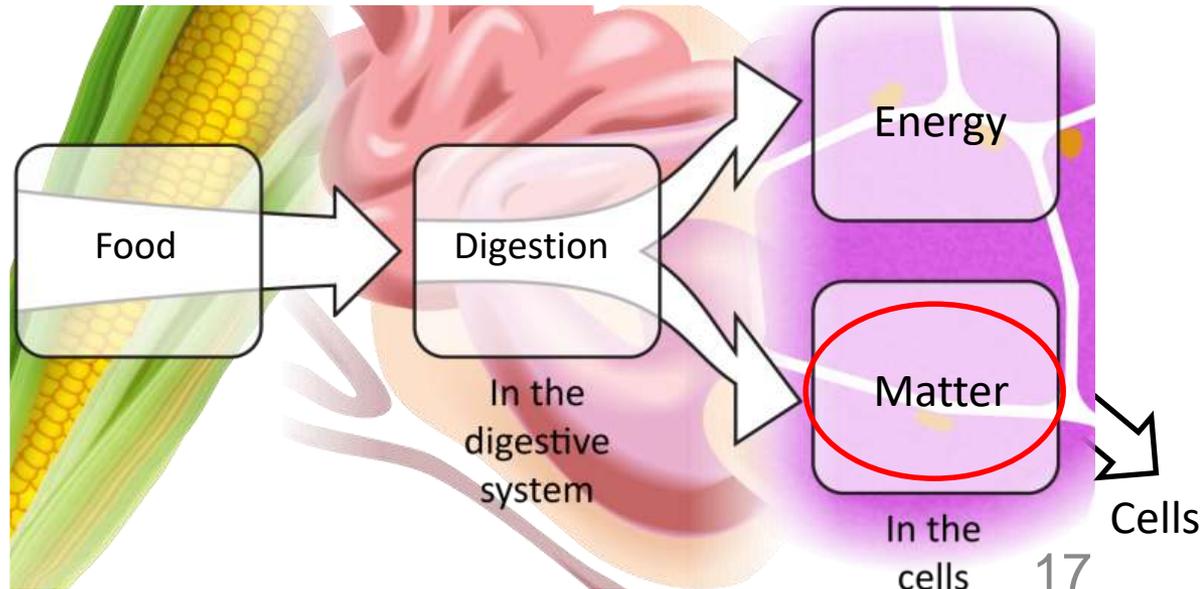
1. Carbohydrate macromolecules (long chains of glucose) are broken into individual glucose molecules.
2. Glucose and oxygen enter the bloodstream and travel to cells.
3. Cells rearrange glucose and oxygen into CO_2 and H_2O .



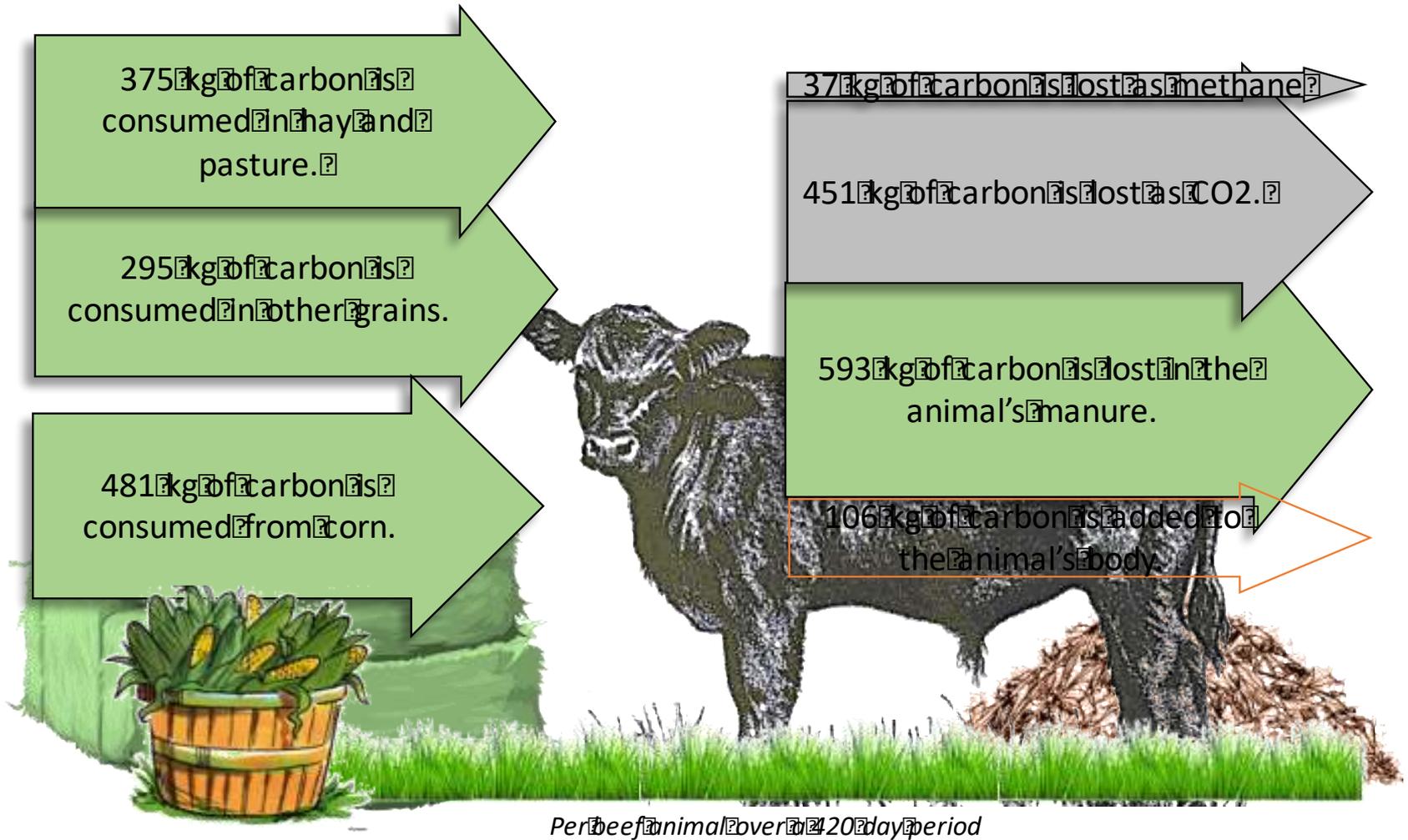
What happens to the food cows eat?

- **About 10% of food is used to create and maintain the animal's cells.**

- All cells are made of atoms. These atoms come from the food an animal consumes.
- The atoms found on in the molecules of food are rearranged to form the molecules an animal needs for its cells.
- The energy of the food molecules stays in these new molecules.



Part 1 Revision



- Can we now improve our claims about the data above?

Looking Ahead: Part 3 Investigation

- In Part 3, you will be investigating how the mass of mealworms change as they eat potatoes.
- You will then compare the mass loss in the potatoes to see if it is similar to what the mealworms gain.



Source: <https://www.piqsels.com/en/public-domain-photo-fmlyd>