

Anaerobic Co-digestion of Organic Solid Waste Progress and Future Prospects

Wallace Yokoma*

Department of Nutrition and Sciences, University of Texas, USA

INTRODUCTION

Digestion is the process by which large insoluble food molecules are broken down into small water-soluble food molecules that can be absorbed into the watery blood plasma. These smaller substances are absorbed into the bloodstream by certain organisms *via* the small intestine. Digestion is a type of catabolism that is frequently classified into two processes based on how food is broken down: mechanical digestion and chemical digestion. Mechanical digestion is the physical breaking down of large pieces of food into smaller pieces that can then be accessed by digestive enzymes.

DESCRIPTION

Mastication in the mouth and segmentation contractions in the small intestine is examples of mechanical digestion. Enzymes in chemical digestion break down food into small molecules that the body can use. Food enters the mouth in the human digestive system, and mechanical digestion begins with the action of mastication (chewing), a type of mechanical digestion, and the wetting contact of saliva. Saliva, a liquid secreted by the salivary glands, contains salivary amylase, an enzyme that begins the digestion of starch in food; it also contains mucus, which lubricates the food, hydrogen carbonate, which provides the ideal pH (alkaline) conditions for amylase to work, and electrolytes (Na⁺, K⁺, Cl, HCO₃). In the oral cavity, approximately 30% of starch is hydrolysed into disaccharide (mouth). Following mastication and starch digestion, the food will take the shape of a small, round slurry mass known as a bolus. Peristalsis will then transport it down the oesophagus and into the stomach. Protein digestion begins in the stomach with gastric juice. The main components of gastric juice are hydrochloric acid and pepsin. Gastric juice in infants and toddlers contains rennin, which aids in the digestion of milk proteins. Because the first two chemicals may cause damage to the stomach wall, the stomach secretes mucus and bicarbonates. They form a slimy layer that protects against the damaging effects of chemicals such as concentrated hydrochloric acid while also assisting with lubrication. Pepsin requires an acidic pH, which is provided by hydrochloric acid. Peristalsis, which is

waves of muscular contractions that move along the stomach wall, occurs mechanical mixing at the same time as protein digestion. This enables a large amount of food to be produced. Pepsin degrades proteins into peptides or proteoses; anaerobic digestion is the breakdown of biodegradable material by microorganisms in the absence of oxygen. The process is used for industrial or domestic waste management or fuel production. Anaerobic digestion is used in much of the industrial fermentation used to produce food and drink products, as well as in home fermentation. Anaerobic digestion occurs naturally in some soils and lake and oceanic basin sediments, and is the source of marsh gas methane discovered by Alessandro Volta in 1776. The digestion process begins with bacterial hydrolysis of the input materials. Insoluble organic polymers, such as carbohydrates, are broken down to soluble polymers. Derivatives made available to other bacteria

CONCLUSION

The sugars and amino acids are then converted by acidogenic bacteria into carbon dioxide, hydrogen, ammonia, and organic acids. Bacteria convert the resulting organic acids into acetic acid, along with additional ammonia, hydrogen, and carbon dioxide, among other compounds, during acetogenesis. Finally, methanogens degrade these byproducts to produce methane and carbon dioxide. Methanogenic archaea populations are critical in anaerobic wastewater treatment. Anaerobic digestion is used in the treatment of biodegradable waste and sewage sludge. Anaerobic digestion, as part of an integrated waste management system, reduces landfill gas emissions into the atmosphere. Anaerobic digesters can also be fed with energy crops grown specifically for that purpose, such as maize.

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

Correspondence to: Wallace Yokoma, Department of Nutrition and Sciences, University of Texas, USA, E-mail: yakomawallace@hotmail.com

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