

Pre-Lab, Skills, and Standards Alignments

BETTER MILK FOR CATS

In this laboratory students will learn the interesting combination of genetics and culture that led to lactase persistence in humans. Next, they will build a “bioreactor” where the enzyme lactase can be used to remove lactose from milk, simulating the industrial production of lactose free products.

Lab Length: 1 hour

Suggested Pre-Lab Teaching

- DNA structure and function
- Central Dogma (genes to proteins)
- Enzyme function

Lab Skills

- Use transfer pipettes to measure small volumes of liquid.
- Test for the product of an enzyme-catalyzed reaction.

Conceptual Knowledge/Skills

- Explain why lactose free milk is a “better milk for cats.”
- Describe the enzyme-substrate reaction that results in the digestion of lactose.
- Use experimental results to demonstrate if an enzymatic reaction occurred.

New York State Science Learning Standards/NGSS

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
<p><u>Constructing Explanations and Designing Solution</u> Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students’ own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</p>	<p><u>LS.3.A: Inheritance of Traits</u> Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1)</p> <p><u>LS3.B: Variation of Traits</u> In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1)</p>	<p><u>Structure and Function</u> Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts; therefore, complex natural and designed structures/ systems can be analyzed.</p>