The effect of concentration of vegeren on clotting times

This investigation is basically about milk coagulation of different milks. Also it includes why each milk type has potentially different milk clotting times using vegeren and how the concentration of vegeren is going to affect the different milks. Vegeren is a vegetarian substitute for rennet, which is also a milk-clotting agent. There are many differences with different milks such as calcium content and protein content. This investigation requires looking at the fat content because this will decide which milk will coagulate more.

In nature, milk is a substance produced by mammals to feed their offspring. Milk contains the essentials to help the young mammal grow and develop in its first months of life. Milk contains water, solids such as fat (lipids), proteins (enzymes, caseins, whey proteins), carbohydrates (lactose) and minerals. Other constituents include vitamins, dissolved gasses and bacteria. Milk provides some compounds, which give initial protection from bacterial disease, until the young mammal can build up its own immunity.

When a mammal suckles, the milk drawn from the teat is warm and sweet, and the milk sugar (lactose) provides both encouragement to drink more and will provide energy later when needed. First-milk, also known as colostrum, is a pre-milk fluid secreted directly after birth for up to 72 hours by nearly all mammals. It provides both immune factors and growth factors to the suckling mammal. The immune factors boost and regulate the immune system which protects the offspring mainly from viruses and bacteria, others include allergens, toxins, and yeast.

A mother can pass cell-specific antibodies to her offspring through the milk to protect it from certain diseases. The young mammal can then produce memory cells for those antibodies to help protect it from the diseases in the future. Colostrum also helps young mammals to grow by stimulating normal tissue growth and aiding repair. It is also a natural food source and therefore aids in normal development. A female is unable to produce milk before producing offspring. The mammary glands secrete milk and the chemical stimulus to do so is the hormone oxytocin produced in the pituitary gland.

The production of milk in the mammary glands is stimulated by the lactogenic hormone, which is also produced in the pituitary gland when the female gives birth. The way it is released is for it to be physically suckled. Raw milk contains the active enzymes Lactase and Lipase among others. With these enzymes present, milk can digest itself. Lactose is a milk sugar composed of two simple sugars, glucose and galactose, chemically bonded together. Lactase breaks down Lactose into glucose and galactose, which makes it easier to digest. Lipase breaks down fats and lipids to give glycerol, fatty acids, and di- and mono- glycerides.

Milk also contains the enzyme galactase for the breakdown of galactose, and phosphatase for the breakdown of Calcium. When milk is pasteurized however, all these enzymes are destroyed to increase the shelf life of the milk. Mammals only drink milk in their first few months as their only food source. At this time, infants usually produce ample quantities of lactase to break down the lactose in milk. The adult human still produces lactase in small amounts but usually not enough to properly digest all the components in pasteurized milk.

When an infant mammal (e. g. a calf) takes in milk from its mother, the milk passes into the fourth stomach, where it comes into contact with two coagulating enzymes in the gastric juice, previously known as rennin, chymosin and pepsin. These enzymes are most active in acidic environments i. e the stomach. Caseinogen is the main protein in milk. Caseinogen is milk caseins combined with calcium. It exists as a suspension in milk. There are four major types of casein molecules. Three of these (alpha and beta molecules) readily separate from Calcium.

However, the kappa casein does not readily come out of the suspension. The two groups, self-associate and combine into micelles. The alpha and beta molecules are kept from separating from the calcium by the interactions of the kappa molecules. So the kappa molecules keep most of the milk protein soluble and prevent it from suddenly coagulating. When milk comes into contact with chymosin (in the gastric juice of a calf), it inactivates the kappa molecules. The alpha and beta molecules separate from the calcium and suspension and when milk fat is incorporated it forms a curd.

Chymosin therefore greatly speeds the coagulating time of milk, causing it to clot into a fine curd, which moves through the intestines slower than milk would. This gives it time to be digested and absorbed into the bloodstream. Mammals secrete the most chymosin as infants. The chymosin is replaced with more pepsin as the mammal grows. Rennet is a substance from animals which coagulates milk. This experiment will use a vegetarian substitute called vegeren. Whole milk, semi-skinned milk and skimmed milk are the three milks, which are going to be used in this investigation.

Before I can investigate the differences in the time of coagulation of the milks, I must understand how each milk differs to each other. This will affect the timings in which it will take for the milk to coagulate. An important factor to consider is fat content of the milks. A secondary factor to consider is protein content because even thought protein is the substance that will physically coagulate the milk, the differences between the protein content of each milk is very small compared to the fat content of each of the milks. Fat is actually the substance which will affect the rate that all the different milks coagulate.