CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35498

Project Title

The Effects of Papain and Bromelain in Denaturing Bos Primegenious

Preliminary

Abstract

Objectives/Goals

We were expecting Papain at 100% concentration, to tenderize the meat faster than Bromelain. Meat has muscles within them that are made of strong fibers. These fibers, which are composed of tough protein bonds sorted in a chain manner, create the meat hard to cut especially the strong connective tissues that sustain the meat together. Papain cuts the protein chains in the fibrils and in the connective tissue disrupting the structural integrity of the muscle fiber and tenderizing the meat. As a result, Papain serves as a protease cutting and tearing the proteins and fats withholding the meat together. The Papain enzyme also speeds up the chemical reaction by lowering the activation energy creating the meat tender.

Methods/Materials

Metal Ring Stand, Clamps, Cow meat, 20mL graduated cylinder, Gram scale, Pineapple(Bromelain), Papaya(Papain), Various Limes(weights), Juicer

Results

Papain was a more efficient meat tenderizer than Bromelain in all trials and concentrations(100%, 50%, and 25%). We discovered that Papain required less weight to break the meat at an average of 426 grams for 100%, 532.6 grams ofr 50%, and 640.6 grams for 25% which differs from Bromelain which required 458 grams for 100%, 615.3 grams for 50%, and 736.3 grams for 25%. The higher the concentration of the enzymes the less weight required to tear the meat.

Conclusions/Discussion

Our Hypothesis concerning the enzyme, Papain, tenderizing the meat faster than the other enzyme Bromelain. As shown from our data and results the 20g strips of meat that were submerged in the Papain enzyme broke with less wight than the 20g strips of Bromelain. The Papain meat was more tnder because of its significant degradation of muscle. Papain enzyme cuts the protein chains in the tissue which then broke the muscle fiber structure in the meat, thus causing the meat to be more tenderized than that of Bromelain enzyme. Also, Bromelain is an enzyme that is known for its low activity which means that the enzyme can be easily denatured,Proving that Papain's effiecieny as a protease protein.

Summary Statement

Our project is analyzing two enzymes by the name Papain and Bromelain and proving which enzyme at different concentrations could tenderize Bos Prigmitus at a rapid pace.

Help Received

AP Biology instructor helped with some equipment including clampers, graduated cylinder, and a stand