

In my research project I investigated the effect of copper, specifically copper sulphate, on hydrogen peroxide breakdown by catalase in the liver of cows and chickens. Hydrogen peroxide is a toxic substance that is a byproduct of many cellular processes in the body. And in order to eliminate this toxin, catalase enzymes in the liver break it down into oxygen and water.

Lactating dairy cows often do not get enough natural copper from a grass fed diet, therefore copper supplements are very commonly given. However, it is particularly dangerous to give cows copper supplements, as excessive copper can lay dormant and stay in the liver for a long time until it may suddenly release and cause acute liver failure. Furthermore, studies show that excessive copper in cow livers can increase the likelihood for oxidized milk which causes an unfavorable taste, a large problem in the dairy industry.

Additionally, copper is used as a dietary supplement to promote quick growth in poultry farming. However, an excessive dose may cause adverse effects such as reduced growth, reduced food intake, and in serious conditions, copper toxicity can lead to oxidative stress

Oxidative stress is a dangerous state for the body of any animal and is characterized by the imbalance of antioxidant production in the body. It can lead to tissue, DNA and protein damage which may cause the development of serious diseases.

Experiments investigating the effects of catalase on the ability of the liver to decompose toxic hydrogen peroxide, and the effect of copper on catalase's ability to do so, is an important component in researching illnesses, promoting animal health, and developing ethical ways to farm animals.

In my experiment, I treated fresh cow and chicken livers with concentrations of CuSO_4 ranging from 0 M to 0.01 M. I measured how the copper sulphate inhibition catalase enzymes in the liver by measuring the volume of oxygen produced in the enzyme reaction through a gas syringe. A large focus of my experiment was the use of statistical testing in biochemical research. I used Anova and Tukey HSD tests which were done by hand and through a computer software to measure the statistical significance of my findings.

The results from both species provided evidence that CuSO_4 inhibits catalase and results in a lower volume of oxygen produced, However, there is a large difference in the extent to which CuSO_4 has an effect on catalase in *Bos taurus* versus *Gallus*.

Based on the results of this experiment, my null hypothesis was rejected as the concentration of CuSO_4 had a significant negative effect on the volume of oxygen (ml) produced and the volume of oxygen (ml) was greater in the *Bos taurus* liver compared to the *Gallus gallus* liver.

I have conducted further research after finishing my report about the correlation between copper and the development of cancer, and the use of copper to treat tumors. In the future I would like to begin with researching whether there is a correlation between the development of cancer and the consumption of copper with a focus on the developing world where people are consuming copper contaminated water due to old copper pipes. I would also love to conduct more lab research within this topic!