CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

J0507

Project Title

Organic and Conventional Chicken Under the Microscope: A Pilot Study Comparing Protein Quality

Abstract

Objectives/Goals

My objective is to conduct a pilot study investigating if organic chicken has higher quality protein than conventional chicken. Food science research indicates that some organic veggies, cereals, and legumes have higher quality protein than their conventional counterparts. Drawing upon medical, food science, and protein chemistry research, I hypothesize that organic chicken has higher quality protein than conventional chicken. Higher quality protein has more essential amino acids.

Methods/Materials

I utilized a digital microscope to measure marinade penetration in cross-sections of organic and conventional chicken breasts. Using molecular biology and biochemistry research, I developed a new method of assessing protein quality: marinade penetration (less penetration indicates higher quality protein and more penetration mean lower quality protein). I applied several methods to improve data quality, including blinding, randomization, teacher review, and double data entry. To tentatively assess if marinade penetrates less deeply into organic chicken, I used a t-test (alpha=0.10).

Results

I carried out 3 trials with a sum of 46 samples (19 conventional and 27 organic chicken breasts). Combined across trials, the mean penetration of marinade into conventional chicken was 679 micrometers (compared to 601 for organic). The t-test is statistically significant (p-value=0.08).

Conclusions/Discussion

There is little research comparing organic to conventional chicken meat. One of the few findings is that organic chicken has a lower risk for contamination from antibiotic resistant bacteria. My pilot study provides new and suggestive scientific evidence showing that organic chicken may also have higher quality protein than conventional chicken. I discuss that nutritional theory suggests eating higher quality protein may be better for the human body.

Summary Statement

My project provides suggestive evidence that organic chicken has higher quality protein than conventional chicken.

Help Received

My science teacher, Mr. Paul Burns, helped design and conduct trials; Noe Marquez helped with graphic design; Sonia Khan and Rachel Padmanabhan provided tutoring in molecular biology and biochemestry; my dad helped with statistics.