**Abstract**

The proposed research offers a new mechanism for understanding the freshness of grocery store meat using fluorescence (FL) spectroscopy. Biological tissue, like grocery store meat, contain fluorescing molecules, called fluorophores. In such meats, either fresh or spoiled, we can see the intrinsic fluorescence (autofluorescence) emitted by these native fluorophores. Food spoilage is mainly caused by microorganisms, such as bacteria. The most important process of the bacteria for food spoilage is microbial metabolism. As the tissue breaks down, or begins to spoil, due to the microbial metabolism, the levels of the native fluorophores such as nicotinamide adenine dinucleotide (NADH) and flavin adenine dinucleotide (FAD) present in a sample change, because these fluorophores are involved in the energy production in the metabolic process. Such changes may be revealed by fluorescence spectroscopy. Therefore, native fluorophores may be unique, reliable and non-subjective indicators for the detection of spoiled meat.

In the research published by Yang et al. they discovered the levels of nicotinamide adenine dinucleotide (NADH) increase as collagen levels decrease in pork tissue. Here we propose to demonstrate a similar trend in chicken tissue using NADH and FAD as well as collagen and tryptophan. The hypothesis is that the bacteria will break down the tissue around the infected sites which will ultimately lead to a decrease in the relative concentration of tryptophan. Measurements are taken with multiple excitation wavelengths, creating an excitation-emission matrix (EEM). The EEM approach may provide us with more robust results for detecting spoilage from fluorophore concentration. Tryptophan levels in the spoiling chicken tissue are also reported in an attempt to determine its role in the spoilage process. FL spectra were analyzed directly using the measured peaks of NADH, FAD, collagen and/or tryptophan.

In our future study, images of the samples will be taken using a FL microscope to develop the concept of a user-friendly approach to detecting meat spoilage. The method may be further developed to design a portal and inexpensive imaging device using a commercial color camera for rapid and reliable meat spoilage detection.