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Feasibility of an optical biosensor for detection of calpastatin

We have been investigating an optical biosensor to detect calpastatin utilizing dual antibody sandwich technique on optical fibers. Calpastatin is a protein found in meat and acts as a regulator of meat tenderness. The ability to accurately predict the calpastatin concentration of beef with a biological sensor at the time of grading would lead to a more accurate assessment of the overall palatability of beef when it reaches the consumer. Meat can then be labeled as tender or tough, which would greatly enhance meat processors' ability to grade meat, allowing them to recover lost revenue. The biosensor technique utilizes fiber optic technology and a dual binding frequency resonance energy transfer (FRET) method. With the FRET method, two calpastatin antibodies are labeled with fluorescent dyes that interact when in close proximity. The antibodies bind with calpastatin on the tip of an optical fiber, creating a dually bound antibody sandwich. This results in a detectable change in the emission spectra of the fluorescent dyes. The results obtained from the biosensor show that calpastatin can be quantified based on its activity, and therefore, that the optical biosensor technique can be used to accurately detect levels of calpastatin.