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Detection and quantification of gluten in fermented and hydrolyzed foods

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Approximately 1 in 141 people in the US are affected by celiac disease and adherence to a strict gluten-free diet is the only option to prevent inflammatory symptoms in sensitive individuals. According to FDA regulation, food bearing the claim "gluten-free" must contain less than 20 ppm (mg/kg) gluten. The regulation also cites the unavailability of scientifically valid analytical methods for accurate quantification of gluten in fermented and hydrolyzed foods. Accurate detection and quantification of fermented and hydrolyzed gluten is essential to support regulatory requirements which focus on the prevention of adverse reactions in gluten-sensitive individuals. Although several commercial ELISAs are available and useful in accurately detecting and quantifying intact gluten present in foods, the accuracy of the available ELISAs in quantifying hydrolyzed and fermented gluten is questionable. This presentation will focus on a study evaluating antibody-based and mass spectrometric methods to detect and quantify hydrolyzed gluten, using brewing of beer as a model for a fermentation process that involves gluten hydrolysis. The effects of a proline endopeptidase, an enzyme marketed to degrade immunopathogenic sequences suspected of causing celiac disease, on the detection and quantification of gluten were examined and the findings will be included in the presentation. Recent attempts in our laboratory to develop competitive ELISA profiles utilizing several commercial gluten specific antibodies to distinguish between different forms of gluten fermentation and hydrolysis will also be discussed.

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Degradation of myofibrillar, sarcoplasmic and connective tissue proteins by proteolytic enzymes and impact on camel meat tenderization

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Camel inside round muscles was treated with bromelain, ficin and papain at 50 or 100 ppm concentration and was subsequently stored at 4°C for 4 days. Effect of enzyme treatment was analysed on day 4 of storage compared to those of fresh samples. Results revealed that papain (100 ppm) treated camel meat showed higher drip loss and lower water holding capacity compared to other treatments ($P<0.05$). Total protein and sarcoplasmic protein solubility and TCA-soluble peptides were found to be higher in papain and ficin treated camel meat at 100 ppm concentration compared to other treatments ($P<0.05$). Papain at 50 and 100 ppm concentration also displayed higher soluble collagen content compared to other samples ($P<0.05$). Electrophoretic profile of whole camel meat depicted a gradual degradation of myosin, C-protein, alpha-actinin and actin in enzyme treated samples, with 100ppm papain giving more promising results. Sarcoplasmic protein bands also decreased in intensity after the enzyme treatments with papain (100ppm) displaying higher decrease compared to other enzyme treatments. At 100ppm concentration, all three enzymes were equally effective in degrading all the myofibrillar proteins intensively, which give strong indication of the tenderizing effect of enzymes in camel meat. Protein degradation effect of the enzymes was also reflected on textural properties. Papain at 100ppm concentration displayed lower hardness values compared to other treatments ($P<0.05$). Thus, the results showed that all enzymes at 100 ppm have good potential for use in camel meat tenderization application with the papain proving out to be more effective among the all.

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