

Industrial Applications of Selected JFS Articles

Use of Rice Bran Fiber as Encapsulant Adds Value to Menhaden Oil

Menhaden oil is a major product in U.S. fisheries, and could be more important if it can be processed for use in food formulations without any accompanying aroma, and with better shelf life. Researchers found methods of encapsulating the oil in a rice bran fiber, and reported their results in “Microencapsulation of Menhaden Fish Oil Containing Soluble Rice Bran Fiber Using Spray Drying Technology”. According to the research team: “The microencapsulation process makes it possible to transform a core ingredient into a powder, where the small droplets of core ingredient are surrounded by a shell coating of proteins and/or carbohydrate resulting in small dry granules that have powdery like flow characteristics.” The use of rice bran fiber as an encapsulant adds to the benefit of menhaden oil, as the rice bran fiber has been found to have several beneficial functions, including hypcholesterolemic, antioxidant, immune-modulation, and antitumor activities. The study found that the emulsion that contained rice bran fiber (which is considered a by-product of rice processing) protected the menhaden oil, extending its shelf life. **E348–356**

Italian Delicacy Is Better, Healthier, When Extra Virgin Olive Oil Is Used

Taralli – an unleavened dough ring popular in Italy – has less oxidized triacylglycerols and diacylglycerols when made with extra virgin olive oils than with olive pomace oil, olive oil, or refined palm oil. *Taralli* rings are boiled briefly before baking, producing a crispy finish somewhat similar to a bagel, which is made in a similar fashion (boiling, then baking). In the paper titled “Influence of the Different Oils Used in Dough Formulation on the Lipid Fraction of *Taralli*,” the research team from Bari, Italy found that *trans* fatty acid isomers were not present in *taralli* made with extra virgin olive oil. Product made with the other oils contained *trans* fats and degradation products, possibly produced during the deodorizing and other processing steps. *Taralli* are often compared with bagels or boiled pretzels, and like those products, acceptability often depends on the formula used to make *taralli* with which one is most familiar. **C549–554**

Salmonella Detection in Real-Time

In “Detection of Viable *Salmonella* in Lettuce by Propidium Monoazide Real-Time PCR,” researchers determined to deal with the problem of identifying *Salmonella* organisms that are viable, and separating them from those that are not. Polymerase chain reaction (PCR) allows rapid detection of pathogenic bacteria in food, but it is inaccurate as it might amplify DNA from dead target cells as well. According to the research team, “This study aimed to investigate the stability of DNA of dead *Salmonella* cells in lettuce and to develop an approach to detecting viable *Salmonella* in lettuce. *Salmonella*-free lettuce was inoculated with heat-killed *Salmonella* Typhimurium cells and stored at 4 °C. Bacterial DNA extracted from the sample was amplified by real-time PCR targeting the *invA* gene. Our results indicate that DNA from

the dead cells remained stable in lettuce for at least 8 d. To overcome this limitation, propidium monoazide (PMA), a dye that can selectively penetrate dead bacterial cells and cross-link their DNA upon light exposure, was combined with real-time PCR.” The net result was that PMA could detect live *Salmonella* at low levels after 12 hours. Current assays generally take 4 to 5 days. A 12 hour test – generally within the time needed to ship product – could catch contaminated material before it was offered for sale. **M234–237**

Identifying Aflatoxin in the Malaysian Diet

The Malaysian diet is rich in cereal-based foods, oilseeds, nuts, and spices – all foods that are likely to develop aflatoxins under storage. Mycotoxins such as aflatoxin cause major health threats, so a research team studied local foods to determine what toxigenic fungi might be common. Their results are provided in the paper titled: “Occurrence of *Aspergillus* spp. and Aflatoxin B1 in Malaysian Foods Used for Human Consumption.” The researchers identified 55 *A. flavus* strains of *Aspergillus*, of which 35 strains produced quantities of AFB1 that would be of serious concern, and 17 strains produced considerable quantities of AFB2. Natural occurrence of AFB1 was detected in 72+% of food products, with maximum amounts of AFB1 in peanut products, although naturally occurring aflatoxins were below the actionable limits. Among the aflatoxins, AFB1 has been found to be one of the most potent naturally-occurring carcinogens. Disease outbreaks of aflatoxicosis in humans and animals due to the consumption of aflatoxin-contaminated food and feed have been reported. The number of foods that contained the mycotoxins might suggest some concern, as the total amount of AFB1 from a variety of foods contaminated with the mycotoxin merits concerns about the total amount consumed, not simply the amount in a single food. **T99–104**

Processing of Whey Protein Introduces Functional Changes

In “Relationship between Functional Properties and Aggregation Changes of Whey Protein Induced by High Pressure Microfluidization,” the differences that occur when whey protein is fluidized under high pressure microfluidization was reported. The study, in which whey protein was treated with HPM under pressure from 40 to 160 MPa, sought to understand what differences in function were introduced by the treatment. The results showed significant modifications in the solubility (30% to 59%) and foaming properties (20% to 65%) of WPC with increasing pressure. However, the emulsifying property of WPC treated at different pressures was significantly worse than in the untreated sample. To better understand this phenomenon, the HPM-induced aggregation changes were examined using particle size distribution, scanning electron microscopy, and hydrophobicity. It was indicated that HPM induced 2 kinds of aggregation changes on WPC: deaggregation and reaggregation of WPC, which resulted in the changes of functional properties of WPC modified by HPM. The research team concluded that “The HPM treatment was beneficial

to enhance solubility and foaming properties of WPC, suggesting that HPM treatment of WPC is appropriate for applications in selected dairy products.” **E341–347**

Season and Sex Affects the Level of Metals Found in Cuttlefish

Researchers studied the level of metal content in the mantle of the common cuttlefish caught in the northeastern part of the Mediterranean. Their research is reported in “The Effects of Season and Sex in the Metal Levels of Mature Common Cuttle-

fish (*Sepia officinalis*) in Mersin Bay, Northeastern Mediterranean.” Heavy metals, such as cadmium, lead, copper, zinc, chromium, and iron, were found in the mantle tissue of the mollusk, and the concentration appeared to depend on both the sex of the mollusk and the time of year. Female cuttlefish had higher levels of copper and lower levels of lead than males throughout the year. Levels of other metals varied throughout the year. Cuttlefish, both male and female, were contaminated with cadmium during all seasons. While the creatures have a short lifespan, they are able to accumulate large amounts of heavy metals, passing it along to those who eat the Cephalopods. **T121–124**