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Seafood Safety During an Oil Spill and the Sniff Test

Abstract

A simple, rapid test has proven effective for screening seafood for petrochemical taint after an oil spill. This test was widely used after the BP oil spill in the Gulf of Mexico. The test was the screening tool at the point of harvest in order to determine if there was obvious oil contamination of the seafood. The test is sensitive to human detection at a level of over 100 times the level of concern for napthalenes in the BP oil spill. Examples lay personnel and media can relate to their personal experience are effective for explaining scientific analytical test procedures.

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Introduction

There was a great deal of concern over the safety of seafood during and after the BP oil spill that sent 4.9 million barrels flowing into the Gulf of Mexico for 87 days (NOAA, 2010). Approximately 20% of the domestic supply of seafood is harvested from the Gulf of Mexico. This short article describes practical and effective communications about control of seafood harvested from the area using a simple analytical test that was easily understood and to which each individual could personally relate.

The First Step to Assure Seafood Safety

In the event of an oil spill, the affected waters are closed to seafood harvesting as a precautionary measure to protect the consumer from accidentally consuming contaminated seafood (NOAA, 2011). This also allows time for assessment and to launch an informed response (Cartwright, Case, Gallagher, & Hathaway, 2002). This is an added measure of caution. The Food, Drug and Cosmetic Act (FD&C) empowers the U.S. Food and Drug Administration (FDA) to prohibit the entry of adulterated food into interstate commerce. The National Marine Fisheries Service (NMFS, a division within NOAA) and state agencies are authorized to close waters under federal and state jurisdictions, respectively.

The Second Step to Assure Seafood Safety: The Field Inspector

A preventive measure of extensive sampling was initiated. Sophisticated scientific equipment is not always needed. The sniff test was used because it was sensitive enough to detect seafood of sufficient (if any) contamination levels to be of concern (Moffat et al., 1998). If the seafood failed the sniff test (or subsequent tests) it was considered contaminated and not allowed to enter commerce. If the sniff test did not detect "taint," then the sample underwent subsequent, more sensitive analyses. Humans can be trained by exposing untainted seafood to known levels of oil 100 times lower than the level of concern in seafood (LDEQ, 2010). A field inspector is trained to screen by taking several shallow sniffs or "bunny sniffs" of a seafood at the point of harvest to determine if there is detectable off-odor known as "taint." Dogs were not used because their noses were so sensitive that they could detect natural, background levels of taint 1,000 times lower than that of humans.

What Is the Contamination?

The contamination is termed "petrochemical taint" in seafood and is defined as a condition when there is an atypical odor or flavor (GESAMP, 1982). In this case, "taint" was due to the presence of the aromatic polycyclic aromatic hydrocarbons (PAHs) compounds (Yender, Michel, & Lord, 2002). Low molecular weight PAHs, such as nalpthalene, in crude oils are highly odiferous and very noxious. They can be smelled on fresh fish at concentrations of only a few parts per million.

Knowing Seafood Is Safe

Regulators began collecting seafood that was known to have been harvested before the oil spill began. The purpose was two-fold: first, to have product with a known history, and second, to have native species that could be intentionally tainted for training purposes. Field inspectors are the first line of defense; they are trained to detect taint at a level of 10 ppm PAHs. If no taint was detected at the point of harvest by field inspectors, seafood samples would be sent to the NMFS Laboratory in Pascagoula, MS. The samples were placed in clear, covered, glass dishes. The Sensory Expert would crack open the lid of the dish and take three shallow sniffs of the headspace odor (headspace is that area between the surface of the fish and the lid of the dish) and immediately cover the dish. The Sensory Experts would freshen or re-set their (olfactory) palette by sniffing the headspace of dishes containing canned corn, freshly cut cucumber, and/or freshly cut watermelon before proceeding to the next fish sample. The test method was adapted from Reilly and York (2001) and used by the National Marine Fisheries Service (NMFS) during and after the oil spill as the first means to detect for petrochemical "taint."

Samples deemed negative for oil taint are then presented for aroma evaluation by a panel of Experts. If the sample is determined to be negative for taint, it is split, and half is cooked and tasted. If this is negative for taint, the remaining half is sent to the NMFS laboratory in Seattle for analytical screening for a panel of other compounds indicative of petrochemical contamination. Experts were trained to detect 0.5 to 1 ppm PAH which is over 100 times lower than the level of concern for napthalenes in the BP oil spill (LDEQ, 2010).

Practical Application of the Sniff Test for Taint

Workshops were held to educate fishermen, processors, chefs, Extension agents, state inspectors, the consumer, and the media about fresh fish and those that had been tainted with known concentrations (10, 20 or 40 ppm). of oil from the spill. Demonstrating the "sniff" testing was the most valuable information that could have been given because "smelling was believing," as suggested by Franz (2007) and Torock (2009). Those who had been skeptical of sniff testing could "smell the difference" and became more confident of seafood safety.

In conclusion, Extension personnel must be prepared with more facts than might be needed to address media inquiries. Information must not be complex, but be sufficient and accurate. Using examples that lay personnel and media can relate to their personal experience is effective for explaining scientific analytical test procedures.

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