**NEW CONCERNS ABOUT AFLATOXINS IN FOODS CAN BE ADDRESSED WITH STATE-OF-THE-ART TECHNOLOGIES**

***Aflatoxins in food and milk can seriously harm humans, animals, and corporate reputations. But Nestlé Group in China and the longest-serving peanut-shelling plant in the USA are both showing how laser sorting machines can eliminate the risk.***

Food contamination by aflatoxins, which can cause cancer, is worrying scientists and regulators. New concerns about these naturally-occurring poisons, voiced earlier this year by scientific advisors, have provided a stark reminder of the health risk to consumers and the commercial risk to food businesses.

Aflatoxins are a problem most commonly encountered with plants grown or foods stored in parts of Asia, Africa, and the United States. This is because the toxins originate in two species of fungus which favour hot and humid climates. In February 2018, however, the European Food Safety Authority (EFSA) reported that there are also concerns about “the elevated aflatoxin levels observed by some food commodities originating from European countries.” Now there are calls for EFSA to make its first full risk assessment of aflatoxins in more than a decade.

These concerns are not surprising: aflatoxins are 68 times more lethal than arsenic and capable of seriously damaging human and animal livers. Aflatoxins can cause fever, malaise, and anorexia, followed by abdominal pain, vomiting, and hepatitis. Worse still, chronic toxicity from aflatoxins can reduce immune efficiency and trigger cancer, which is why they are classified by the World Health Organization as a Group 1 Carcinogen. Exposure to aflatoxin-contaminated food is known to have caused hundreds of deaths in India and Kenya and many more fatalities have probably gone unreported. Even in Europe, where there are strict rules about food safety, in 2013 several nations reported widespread aflatoxin-contamination of milk.

The most poisonous type of aflatoxin, B1, occurs naturally in a wide range of foods. This fungus infects cereal crops including wheat, plus walnut, corn, cotton, peanuts and tree nuts. Aflatoxin B1 also infects spices, crude vegetable oils, figs, other dried fruits, cocoa beans, and rice. Another type of aflatoxin, M1, can be present in milk taken from animals which have eaten feed contaminated by aflatoxin B1. Pasteurisation of the milk does not protect against aflatoxin infection.

Aflatoxins are not harmful to humans or animals if consumed in small doses, but aflatoxin-intake from food and milk does have to be kept low. This is why, in many parts of the world, maximum permissible levels of aflatoxins in food are defined by law. If regulators find these levels exceeded, the business responsible pays a heavy price. In addition to the expensive disruption of a product-recall, there is the likelihood of costly and possibly fatal brand damage.

All of these dangers are made worse by the fact that aflatoxins are invisible to the naked eye.

**Why good samples can lead to bad news**

Some food businesses check for aflatoxins by testing samples of their products. This might seem like a responsible precaution, but unfortunately it is not dependable. Taking samples does not provide statistically-adequate proof that the product is wholly safe. To visualise why, imagine peanuts filling a huge silo. That’s a lot of peanuts. The problem is that dangerously high levels of aflatoxins can be present in the silo but only in small clusters of nuts. This means there is a correspondingly small chance of those contaminated nuts being picked for a test-sample - and a very high chance they will reach a customer and would fail a regulator’s test.

One alternative to taking samples is to blanch the peanuts, passing them through a low-temperature heat treatment to loosen and then remove the seed coat. But this process is unpopular with food producers because it can shorten the product’s shelf-life and adds considerably to costs.

The other solution, and by far the safest, is to rely on detection by sorting machines.

**Sorting machines recognise and dispose of aflatoxins**

The best method for aflatoxin detection is to employ sensor-based sorting machines produced by TOMRA, the global pioneer in food safety assurance technology. TOMRA’s machines employ Near Infra-Red (NIR) spectroscopy, fluorescent lighting, and state-of-the-art lasers to analyse the surface structure and elemental composition of objects passing along a food production line. The special optical design of TOMRA’s Detox laser makes it possible to identify the extremely low intensity of light reflected by aflatoxin mould and fungus in a variety of food types, enabling the detection of aflatoxin contamination.

In addition to this extraordinary capability, TOMRA’s sorting machines also employ unique biometric signature identification (BSI) technology. BSI works by detecting the biometric characteristics of the food items it scans - for example, nuts and raisins - and compares these to features stored in the machine’s database to determine whether the items should be accepted or rejected. This detects and removes smaller defects than is possible with conventional spectral technology. Detection accuracy is so good that false-rejection rates are exceptionally low and yields exceptionally high.

A good example of this technology can be seen in action at Nestlé Group’s processing line in Dongguan, China, run by sub-brand Hsufuchi Foods. Quality and safety are one of the ten corporate principles at Nestlé, which has chosen TOMRA as its strategic partner in fighting aflatoxin contamination in peanut products. Since September 2016 Hsufuchi Foods has operated two TOMRA Helius free-fall sorting machines to achieve Nestlé’s global quality standards, which are more stringent than China’s domestic food safety regulations.

More than supplying sorters to fight aflatoxins, TOMRA also provides comprehensive support in setting-up and optimising the machines. To validate Nestlé’s Helius sorters with Detox technology, TOMRA’s application support teams conducted a six-month test on the Dongguan processing line, adjusting sorting parameters with more than 500 tons of peanuts of different varieties. TOMRA also worked with Nestlé on quality inspection and invited a third-party inspection agency to define validation protocols, ensuring the validation process and results were sufficiently representative.

Zhang Ahfung, deputy general manager in charge of production at Dongguan, said: “TOMRA’s technical support was very efficient and quick in response, both in the test phase and after machine installation. Through many tests we are now assured that TOMRA’s Helius sorter can effectively control the level of aflatoxin in peanuts. This puts my mind at ease, because I do not have to worry about our product quality any more. Now we will consider implementing a Detox-technology-based sorter in all facilities where aflatoxin problems arise.”

**Leading US supplier “astounded” by the results**

Smaller, family-owned businesses also benefit from TOMRA’s technologies. As illustration of this, three examples of the company’s Nimbus free-fall sorting machine, each equipped with the laser module required to detect aflatoxin, are used by the Damascus Peanut Company in the USA. This specialist peanut-shelling business employs approximately 125 people and runs its factory in Arlington, Georgia, for 24 hours per day. This is the oldest operational peanut-shelling plant in the country but has stayed ahead of the game by employing state-of-the-art equipment and has relied on TOMRA machines since 2002. The result is high-quality peanuts, supplied to many well-known food brands in Europe and Japan as well as the USA.

Damascus acquired the first TOMRA machine in 2002 with the intention of sorting foreign material from its line, with no expectation that the machine might also sort aflatoxin- contaminated nuts - but a pleasant surprise was on the way. TOMRA’s machine happened to be installed at Arlington during a year of unusually poor crop quality and highly-prevalent aflatoxin. When the plant’s end-lots were tested for aflatoxin, the results were massively better than those at three other plants in the group. This lead Damascus to ask TOMRA if its machine also sorted aflatoxin. TOMRA shared that it had a peanut customer using a TOMRA sorter claiming that he had figured out how to remove aflatoxin with it. TOMRA requested Damascus to also check the reject of the TOMRA sorter. Soon after, the results of several chemical tests -coming back as ‘firecracker hot’- gave a first good indication of the machine detecting and removing aflatoxin tainted peanuts. At this point TOMRA sent laser-application engineers to Damascus to refine the machine’s aflatoxin-identifying capabilities, which became totally dependable.

Bryan Willis, President of Damascus, explained: “Aflatoxin is an expensive problem for a peanut processor. Before we had TOMRA’s machines, the only way to really deal with aflatoxin was to blanch. But compared to blanching, using a laser is much, much less expensive. Because of this, our machines have paid for themselves many times over. And of course the machines also do a great job of detecting and removing foreign material, which is the reason we originally purchased them before discovering they can sort something humans cannot see.

“To begin with, we were sceptical about the machine detecting aflatoxin. But then we began to understand that the toxin is structurally different to the meat of the peanut. The laser sorter looks at the toxin no different than it would a piece of glass, metal, or any organic material that is not peanut. It was very hard for the industry to understand this at first, because it was such and advancement over existing technology. I’m still astounded, but the proof is in the results, and the aflatoxin problem has been solved!”

Bjorn Thumas, Director Business Development Food at TOMRA Sorting Solutions, said: “What our machine does is equivalent to inspecting every single kernel, which is exactly what’s needed to ensure food safety. Of course the system also simultaneously performs other important sorting functions, taking out foreign material and removing allergens from the line. And when handling corn, the laser can also differentiate between GMO- and non-GMO seeds.

“Our machines increase productivity and improve yields at the same time as providing protection against one of the biggest dangers facing the food industry. Aflatoxins are a potential killer - of humans and of businesses - but we can keep them under control.”

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