HOT SOURCE

EXPERT INSIGHTS INTO SAFE, SUSTAINABLE AND HIGH-QUALITY FOOD

ISSUE 16 • OCTOBER • 2017

INCREASED DEMAND RAISES THE RISK OF SEAFOOD PRODUCTION SHORTFALLS
FIPRONIL IN EGGS – ANOTHER FOOD ISSUE IN EUROPE
MONITORING MYCOTOXINS: PROTECTING THE FOOD INDUSTRY
PRACTICAL FSMA GUIDANCE FOR FOREIGN SUPPLIERS
FIGHTING FRAUD: DETECTING INTENTIONAL ADULTERATION IN MILK
SGS LAUNCHES CHINESE VISUAL TRUST INITIATIVE WITH CARREFOUR
AGRICULTURE & FOOD TESTING IN MOROCCO

SGS

DEAR READER,

As food contamination stories once again hit the headlines – this time in Europe – we take a timely look at the discovery of fipronil-contaminated eggs in 49 countries. In this issue of Hot Source we review the situation, the impact on Europe's egg and poultry industry – where 258 companies were prohibited from selling chicken or eggs during a recall period.

In a similar vein, we also explore the issue of contaminated milk, specifically economically motivated adulteration. Learn about some of the most common forms of adulteration, and the monitoring and testing that can help to reduce both the risk of it happening, and the risk of adulterated products reaching consumers.

The food contamination theme continues as we also look at the risk mycotoxin contamination poses to human health, and how you can protect your operations.

Continuing our series on the Food Safety Modernisation Act (FSMA), this issue looks at the Foreign Supplier Verification Programme (FSVP) and clarifies its impact on US importers and their suppliers from outside the US.

Per capita seafood consumption has more than doubled in just 50 years, with the global population predicted to reach 9 billion by 2050, the Food and Agriculture Organisation of the United Nations (UN FAO) has identified a food gap. We review the opportunities this presents for the industry and the certification schemes that hope to keep aquaculture sustainable and productive.

At China's National Food Safety Week, in Beijing, with Carrefour we launched the 'Visual Trust Initiative' an end-to-end digital solution that allows Chinese shoppers to access data about a product's quality and origin by simply scanning a QR code.

We also introduce you to one of our agriculture and food testing laboratories in Casablanca, Morocco from which we offer a diverse range of testing and analysis services.

For the complete range of SGS services and support visit: www.foodsafety.sgs.com.

SGS AGRICULTURE AND FOOD TEAM

CONTENTS

INCREASED DEMAND RAISES THE RISK OF SEAFOOD PRODUCTION SHORTFALLS

Demand for seafood is on the increase, per capita consumption is now more than double what it was 50 years ago. In the 1960s, per capita consumption was 9.9kg and in 2016 it exceeded 20kg per capita.

Global food production needs to double to meet the demands of a growing population, which is expected to reach 9 billion by 2050. At the same time, demand for seafood is also increasing.

Almost a third of commercial fish stocks are now fished at biologically unsustainable levels, which is triple the level of 1974. The state of the world's marine resources has not improved at the same rate that demand has increased.

AQUACULTURE OPPORTUNITY

The Food and Agriculture Organisation of the United Nations (UN FAO) has identified a food gap with seafood, if production does not increase to keep pace with demand. It is predicted that global seafood demand will exceed 260 million tons by 2030 and that the current predicted supply at today's rate will be 210 million tons. This 50 million ton shortfall in production will need to come from aquaculture and it has the capacity to meet global demand. Aquaculture is the fastest growing food production system in the world and more than half of the fish consumed globally already come from aquaculture.

Some concerns about aquaculture production have given rise to seafood certification and SGS can provide certification to the major aquaculture standards.

ASC

The Aquaculture Stewardship Council (ASC) was founded in 2010 by the World Wildlife Fund for Nature (WWF) and the Dutch Sustainable Trade Initiative (IDH). Its goal is to transform the world's seafood markets and promote best environmental and social aquaculture performance. A series of standards were developed through a process called the Aquaculture Dialogues which involved scientists, conservation groups, NGOs, aquaculture producers, seafood processors and the retail and food service industries.

Eight current ASC standards cover 12 species; abalone, bivalves (clams, mussels, oysters, scallops) freshwater trout, pangasius, salmon, shrimp, tilapia, seriola and cobia. The environmental standards are concerned with biodiversity, feed, pollution, diseases, chemical and medicine use and wild seed collection. The social standards are concerned with child labour, community interactions, indigenous people interactions and equitable working environments.

BAP

The Best Aquaculture Practices (BAP) set of seafood standards were developed in the mid 2000s and are one of the main aquaculture standards for producers wishing to import product to North America or Europe. The standards have wide support from the majority of retailers in North America and cover areas such as traceability, food safety, worker welfare, animal welfare and environment. The standards are unique in that they require all facilities to test product and also, in some cases, water and effluent. SGS can provide certification to the BAP standards and can also provide laboratory testing of product as required by the standards.

GLOBAL GAP

The GlobalG.A.P. Aquaculture Standard is one of the more established standards in seafood, having been founded in the early 2000s. It is a key requirement for most producers who are exporting to European retailers and like BAP covers traceability, food safety, worker welfare, animal welfare and environmental issues. SGS can perform GlobalG.A.P. audits in all the major aquaculture producing regions in the world for GlobalG.A.P. Aquaculture, Chain of Custody and Compound Feed Manufacturing.

For the complete range of SGS services and support visit www.foodsafety.sgs.com or send an email to food@sgs.com.

CORMAC O'SULLIVAN
Seafood & Aquaculture Audit & Certification Manager
Phone: +353 (0) 871 169737
Email: Cormac.O'Sullivan@sgs.com
SGS Agriculture and Food

FIPRONIL IN EGGS – ANOTHER FOOD ISSUE IN EUROPE

Europe's egg industry was reeling due to the discovery of fipronil-contaminated eggs. Based on preliminary investigations, it appears possible that a Dutch company colluded with a Belgian supplier, mixing fipronil with a cleaning and sanitising solution, then applying it on or near egg-laying hens to treat lice and ticks.

The issue is that this insecticide, fipronil, is not approved for this purpose.[1] Millions of eggs[2], egg products and products containing these eggs have been recalled.[3] According to one report potentially 28.1 to 35 million contaminated eggs could have been shipped to the state of Lower Saxony in Germany.[4]

RECALLS IN ACTION

On July 20, the Belgian authorities reported fipronil contamination in eggs. Then, a few days later, contaminated eggs were also found in The Netherlands. A recall took place, resulting in millions of eggs being withdrawn from the market and hundreds of operations being closed by the authorities. It transpired that contaminated eggs had been distributed to Germany, the United Kingdom, Luxemburg, France, Sweden, Switzerland[5] , Romania and even to Hong Kong. Additionally, it now appears these contaminated eggs were also distributed to Austria, Ireland, Italy, Poland, Slovenia, Slovakia, Spain, Hungary and Denmark.[6] Of its 28 Member States, in the EU only Lithuania and Croatia have not reported finding fipronil contaminated eggs; a total of 49 countries reported contamination.[7] This event resulted in almost 600 notifications to the EU's Rapid Alert System for Food and Feed products (RASFF).

Fortunately, in Europe individual eggs are required to be coded, so recall efforts can be made down to the individual egg. Unfortunately, innocent farmers and suppliers are likely to face financial ruin as people will avoid eggs from the Netherlands and Belgium even if specific companies are not involved in the scandal. As of 28 August the damage was estimated at 33 million euros, as 258 companies could not sell any chicken or eggs during this recall period.[8]

WIDER CONTAMINATION CONCERN

There is also the issue of whether the meat from these hens is also contaminated.[9] So far, all the testing of chicken meat has indicted that no contaminated product has reached the public.

Unfortunately, this won't stop the public avoiding other poultry products from the areas under investigation. Retailers and governments not in receipt of any of the recalled eggs are announcing this publicly. For example, the UK government has publicly announced that 85% of eggs are local and that the 700,000 eggs imported is a very small fraction, 0.007%, of those consumed every year in the UK. However, this 700,000 is far larger than the 21,000 originally reported to have been received.

INTERNATIONAL ACTION

Some countries are taking action against eggs and egg farms, and recalls are happening even in countries that haven't received contaminated eggs from Europe. In the Republic of Korea, the Ministry of Agriculture, Food and Rural Affairs investigated the practices of their egg industry and found one farm using fipronil, and its eggs were contaminated. This resulted in major recalls of eggs in the Republic. Another farm's eggs had more than the recommended amount of another insecticide, bifenthrin.

[1] http://www.dw.com/en/fipronil-in-eggs-dutch-police-arrest-two-suspects/a-40043017
[2] http://www.foodsafetynews.com/2017/08/dutch-egg-recall-for-insecticide-contamination-spans-the-globe/#.WYzFA03ruP8
[3] https://www.food.gov.uk/news-updates/news/2017/16427/update-on-fipronil-in-eggs-10-august
[4] http://news.xinhuanet.com/english/2017-08/16/c_136530981.htm
[5] http://www.foodnavigator.com/Policy/Netherlands-and-Belgium-face-off-in-fipronil-spat
[6] http://www.foodnavigator.com/Policy/Dutch-arrests-made-as-fipronil-egg-scare-spreads-to-17-markets?utm_source=newsletter_daily&utm_medium=email&utm_campaign=11-Aug-2017&c=ZjWGAZuD8plawLWSG2mBZRCt8RY%2B2Yn9&p2
[7] https://nltimes.nl/2017/09/05/fipronil-contaminated-eggs-found-45-countries
[8] https://nltimes.nl/2017/08/28/claim-organization-help-farmers-hit-poison-egg-scandal
[9] https://www.theguardian.com/world/2017/aug/14/chicken-meat-exported-africa-belgium-tested-insecticide-fipronil

This investigation has prompted the Korean government to investigate every egg farm from the largest to the smallest.[10] After investigating 245 of 1,239 egg farms the government has found four with contaminated eggs.[11] During this investigation, three major retail chains have stopped distributing eggs until the investigation is completed. The government has decided to destroy all the contaminated eggs, regardless of the level of contamination. This demonstrates neatly that one area or country affected can become a global problem that many governments or agencies will investigate.

In Europe, the situation continues to evolve, however, a ministerial meeting was held on September 26 and fact finding trips to all the Union's affected countries are underway and will conclude in early October.

A QUESTION OF TIMING

Currently, the news reports arguments between government agencies in Europe, as there are questions as to when Belgian officials actually knew about the contamination and why it took so long for them to notify the other government authorities about it.[12]

It was reported that in November 2016 Dutch authorities received a tip off about insecticide usage, but it was investigated as a food fraud instead of a health hazard. The Belgian authorities knew of the contamination on June 2, 2017, but didn't alert the European Rapid Alert System for Food and Feed (RASFF) until 22 days later. Although the food fraud claim was received by the European Commission on July 6, since the food fraud system is not coordinated with the rapid alert system nothing was done for almost three weeks.[13] In September, the European Commission will hold a crisis meeting to discuss what happened and how to prevent this from happening again.

EU MAXIMUM RESIDUE LIMITS

Fipronil is a common insecticide for treatment against fleas, mites, ticks, ants, cockroaches, locusts and other similar insects. It works by disrupting an insect's central nervous system. In many countries it is used to fight tick and flea infestations in dogs and cats. For eggs, European legislation sets the maximum residue level (MRL) for fipronil in Regulation (EC) No 396/2005 at 0.005 mg/kg. The regulation also sets MRLs for a range of food products for such as onions and shallots at 0.02 mg/kg, and broccoli, cauliflower, leeks and Brussels sprouts at 0.01 mg/kg.

ACCEPTABLE DAILY INTAKE

In the 2006 conclusion report for this insecticide, the European Food Safety Authority (EFSA) stated that the Acceptable Daily Intake level is 0.0002 mg/kg Body-weight/day.[14] On July 16, 2013 the EU voted to ban the use of fipronil on corn and sunflowers which took effect at the end of that year as this insecticide was one of the main chemical causes blamed for the spread of colony collapse disorder among honey bees.[15]

The real issue is that fipronil is not approved in Europe for use on animals destined for human consumption. However, the EU insists that there is no threat to humans while the World Health Organisation states that in large quantities it can be harmful to humans' kidneys, liver and thyroid glands.

It was determined that when animals consumed forage that was treated with fipronil that the insecticide accumulates in the fat, liver, muscles and meats of food animals. Hence, these MRLs exist in the EU.

SGS TESTING SERVICES

SGS can perform testing for fipronil in eggs and poultry meats. Fipronil can be tested for by using either gas chromatography-mass spectrometry or liquid chromatography-mass spectrometry methodologies. The SGS Institut Fresenius food laboratory in Berlin, Germany is just one of the SGS labs that can perform this pesticide testing, using the DIN EN 15662 method, and has a determination limit of 0.003 mg/kg in eggs and egg products. The EU has established a limit of non-detection of 0.005 mg/kg for egg and egg products. Pesticide regulation with regard to the usage of and levels of fipronil that are allowed on food products are very complicated and differ between countries and products. At SGS, we recommend consulting an expert or regulation database before using a pesticide and before shipping a product that has been exposed to a pesticide. For the latest pesticide regulatory information please consult SGS Digicomply.

Many pesticides, such as fipronil, have beneficial uses. However, as with any chemical, when used improperly or in a manner not approved by a regulatory agency, they can cause harm. This is the primary issue in this matter.

For the complete range of SGS services and support visit www.foodsafety.sgs.com or send an email to food@sgs.com.

JIM COOK
Global Food Inspection Technical Manager
Phone: +1 973-461-1493
Email: James.Cook@sgs.com
SGS Agriculture and Food

[10] http://www.koreaherald.com/view.php?ud=20170815000109
[11] http://www.chinadailyasia.com/articles/126/16/216/1502868436241.html
[12] http://www.express.co.uk/news/world/839541/eggs-Fipronil-contamination-pesticide-European-Union-food-safety-Brussels
[13] https://www.forbes.com/sites/davidschrieberg1/2017/08/13/with-egg-on-their-faces-european-officials-confront-the-rolling-contaminated-egg-scandal/2/#47be436e27a1
[14] http://onlinelibrary.wiley.com/doi/10.2903/j.efsa.2006.65r/epdf
[15] https://ec.europa.eu/food/animals/live_animals/bees/pesticides_en

MONITORING MYCOTOXINS: PROTECTING THE FOOD INDUSTRY

Mycotoxins pose a serious threat to human health. Businesses that supply food need to take the threat of mycotoxins seriously to protect their brands from the consequences of mycotoxin poisoning.

Mycotoxins are a toxic secondary metabolite produced by fungi growing on a range of crops, including grains and nuts. They remain chemically stable at high temperatures, meaning they can travel through the food supply chain unaffected, making them a severe threat to human health.[1]

Food manufacturers around the globe need to be aware of the threat posed by mycotoxins. In Indonesia, the tropical growing conditions for corn, together with humid storage environments, mean mycotoxins are becoming a serious problem for the health of Indonesia's domestic poultry industry.[2] In Nigeria, the federal government has issued a warning over food safety, saying 5,160 Nigerian's are killed each year by food diseases, including mycotoxin poisoning from aflatoxin in nuts, cereals, dried cassava and yam.[3]

In early 2013, Romania, Serbia and Croatia, were among several EU countries to report milk contaminated with aflatoxins, milk that was destined for human consumption, or use in food products. In late 2012 Europe's Rapid Alert System for Food and Feed (RASFF) reported 10 notifications of aflatoxin B1 in maize of European origin, more than the total reports in the previous 10 years. Warmer temperatures across the continent mean mycotoxins are becoming more of an issue.

The risks cannot be underestimated. A small amount of infected grain added to a Panamax vessel of uncontaminated corn can render the entire shipment inedible as there is no practical way to retrospectively segregate sound cargo from contaminated lots. Food manufacturers cannot afford to ignore the potential for mycotoxin contaminated crops ending up in their products as mycotoxins are potentially fatal. Companies must employ effective early warning systems to protect their customers and their reputations.

SGS SOLUTIONS: MYCOTOXIN MONITORING PROGRAMME

Traditional laboratory analysis and strict threshold-based regulations have proven themselves to be costly and error-prone, which is why SGS developed its Mycotoxin Monitoring Programme. Started in 2014, the programme now covers ten south-east European countries – Ukraine, Russia, Bulgaria, Hungary, Croatia, Romania, Poland, Serbia, Slovakia and the Czech Republic.

This early warning and monitoring programme focuses on corn and wheat crops and works in line with the requirements of several certification schemes, such as Good Manufacturing Practices (GMP+), the Feed Chain Alliance Standard (OVOCOM), Good Trading Practice (Coceral GTP), Agricultural Industries Confederation AIC, European Feed and Food Ingredient Safety Certification (EFISC), and Quality Scheme (QS). It provides an effective early warning notification system against Aflatoxin (B1 and total), Ochratoxin, Deoxynivalenol, Zearalenone, Fumonisins, and HT-2/T-2.

Sampling is administered under Grain and Feed Trade Association (Gafta) rules. Screening begins while the crop is still standing, with these early investigations accounting for about 15-20% of the tests. The rest of the samples are then taken when the grain is in storage or at the first collection point. Sampling is completed within four months of the harvest.

All samples are analysed at one of six laboratories in the region – Ukraine, Russia, Bulgaria, Hungary, Romania, or Serbia – using LC-MS/MS and HPLC. The data produced by SGS is targeted and specific, and can help identify potential problem areas at a very early stage. This data will help food manufacturers identify supply chain problems, affording them time to make alternative arrangements to protect their brand from potential contamination and/or supply chain interruptions.

Food companies need to be aware of the dangers of mycotoxins. Their ability to travel from the farm to the plate unaffected by the many stages of the supply chain mean they pose a serious risk to human health. SGS's network of laboratories which deliver mycotoxins testing worldwide and our European Mycotoxin Monitoring Programme are effective risk mitigation tools for companies seeking to protect both their customers and their brands.

For the complete range of SGS services and support visit www.foodsafety.sgs.com or send an email to food@sgs.com.

GENNADIY SHULGA
Vice President Business Development
Phone: +41 22 739 93 74
Gennadiy.Shulga@sgs.com
SGS Agriculture and Food

[1] https://www.whatech.com/market-research/food-beverage/369380-grain-analysis-market-worth-2-3-billion-by-2022
[2] http://www.efeedlink.com/contents/08-08-2017/ad4087a9-20e9-4539-ae2d-ed73e29b7745-1005.html
[3] http://niyitabiti.net/2017/09/fg-worries-over-annual-5160-deaths-by-food-diseases/

PRACTICAL FSMA GUIDANCE FOR FOREIGN SUPPLIERS

In our August article, we discussed supply chain risk management and supply chain verification activities. In this issue we explore practical steps to help foreign suppliers comply with FSMA.

Supply chain verification is a key area in FSMA and is covered by the two Preventive Controls rules (PC Human Food and PC Animal Food) as well as the Foreign Supplier Verification Programme (FSVP). All three rules are aligned in terms of supplier verification requirements; something that provides consistency across FSMA rules.

However, suppliers outside the US still have questions about FSVP and Preventive Controls. There appears to be some confusion around the term "foreign supplier" in the FSVP rule, which we hope this article will help clarify. This article focuses on non-farm facilities. We will cover farms and the produce safety rule in our next articles.

FSVP VS. FOREIGN SUPPLIERS

The FSVP rule is for US importers. The key principles of the rule are as follows, it:

- Requires importers to share responsibility for ensuring safety of imported food
- Is risk-based (according to types of hazards, importers, and suppliers)
- Provides flexibility in meeting requirements (assessing activities conducted by others)
- Is aligned with supply-chain provisions of the Preventive Controls rules

Therefore, if you are a foreign (non-US) food supplier, your US importer is likely to be covered by the FSVP rule and may have already contacted you (or will contact you) to collect information about your food safety system. US importers are required to have a product and supplier evaluation (risk assessment) process, supplier evaluation and approval systems, as well as a supplier verification programme in place. Therefore, your importer will determine which verification activities are appropriate to the identified hazards through risk assessment.

US importers are addressing supplier verification requirements in different ways, and looking for assurances that their foreign suppliers are compliant with the preventive controls requirements. Therefore, foreign suppliers are expected to have a good understanding of the requirements of the Preventive Controls rules in order to ensure the foreign facility's compliance with FSMA.

TRAINING FOREIGN FACILITY STAFF

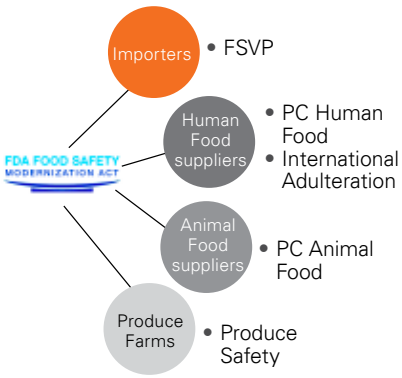
Since foreign suppliers covered by the regulation are expected to comply with the Preventive Controls rules, it is therefore advisable that these foreign suppliers get expert training on FSMA Preventive Controls. This helps foreign facilities achieve three main objectives:

1. Helps foreign suppliers develop in-house resource(s) such as PCQI (Preventive Controls Qualified Individual)
2. Provides know-how to help foreign companies develop a food safety system that complies with US importer's requests
3. Makes it easier for the facility to go through a FSMA audit and/or a future FDA audit

PCQI training: One of the most popular courses is the FSPCA Preventive Controls course (also commonly known as PCQI course). Facilities covered by the rule are required to have a PCQI. The preventive controls qualified individual is crucial to the management and preparation of the food safety plan, validation of preventive controls and more.

Training the food safety team: In addition to the PCQI training, foreign suppliers can register their employees to attend Preventive Controls implementation courses. This will help the facility's food safety team get a detailed understanding of FSMA preventive controls and how to implement them within their companies.

Training production employees: The FSMA Preventive Controls rules specify training in food hygiene as a basic requirement. This can be achieved by providing FSMA food hygiene training to these employees in their local language.



WORKING WITH THE IMPORTER

Coordinating and communicating with the US importer is a critical success factor in building a compliant system. Foreign suppliers required to comply with Preventive Controls rules are encouraged to seek advice and communicate with their importers and make sure both parties are aligned in their compliance expectations. US importers have access to consultants, and can therefore facilitate their suppliers' compliance journey by providing support and/or liaising them with consulting and training bodies that can help their suppliers. Another key challenge that importers can help with is reducing the language barriers and facilitating the communication and educational process for their suppliers.

Finally, importers will have an even bigger role to play with the Voluntary Qualified Importer Program (VQIP). VQIP offers expedited review and entry of food into the US. Once FSMA accredited certification becomes available, it will be the core of VQIP. In order to participate in VQIP, importers must import food from certified facilities.

For the complete range of SGS services and support visit www.foodsafety.sgs.com or send an email to food@sgs.com.

HANK KARAYAN
Global FSMA Program Director
Phone: +1 514 402-5810
Email: Hank.Karayan@sgs.com
SGS Agriculture and Food

FIGHTING FRAUD: DETECTING INTENTIONAL ADULTERATION IN MILK

Milk is an excellent source of protein, fat, carbohydrate, minerals, and vitamins. Therefore, it is a popular choice for people of all age groups. With growing demand, it has been found that milk is being adulterated for economic gain. Due to inadequate monitoring and lack of proper law enforcement, this situation is worse in developing and undeveloped countries, particularly when milk is produced locally and sold directly to individuals. Studies have shown that, occasionally, 100% of liquid milk has been diluted in some way.

HOW IS MILK ADULTERATED?

The adulteration of milk is an act of intentionally reducing its quality, offering it for sale either by admixture, substitution of inferior substances or by the removal of some valuable ingredient. Adding water to liquid milk is the simplest means to increase the volume.

The most common approach to measuring and controlling milk quality is to determine its protein and fat content. This has resulted in both components being substituted with nitrogenous compounds (melamine, urea, whey) and vegetable oil to improving apparent protein and fat content. In recent years, the use of melamine has become an important issue and attracted worldwide attention because of its harmful nature, which has resulted in several food safety incidents. As vegetable oil cannot be dissolved in liquid milk detergents are added as an emulsifying agent.

To extend the shelf life of milk by inhibiting bacterial growth other substances such as formaldehyde, hydrogen peroxide, benzoic acid and salicylic acid have also been introduced. These compounds can cause serious adverse health effects.

Besides chemical adulterants, milk from different species is also assessed in order to avoid allergenic effects in children as a result of admixing of bovine milk with milk from goats or sheep.

To address concerns relating to health, safety and to prohibit mislabelling in milk, Codex set a standard for milk and milk products in 2003. It only allows milk to be a mammary secretion from milking animals without addition or subtraction.

More recently, the Food and Safety Standard Authority of India (FSSAI) and Hong Kong Centre for Food Safety have also regulated adulterants in milk.

ANALYTICAL TECHNIQUES FOR MILK ADULTERATION

Over the last decade, many analytical methods have been proposed for rapid screening and confirmation of milk adulterants. Chromatographic techniques such as high performance liquid chromatography with UV, or fluorescence detection (HPLC/UV, HPLC/FLD) and gas chromatography with flame ionisation (GC/FID) are commonly used for checking food preservatives and fat analysis. Recently, LC and GC coupled with mass spectrometry (MS) have become state of the art for highly sensitive and selective determination. Spectroscopic techniques including near infrared (NIR) and mid infrared (MIR) are powerful and rapid tools which enable simultaneous detection of multiple adulterants in milk with high sample throughput needing little or no sample preparation. However, the latter technique suffers from a lack of standardisation and no regulatory recognition.

To determine milk fraud from different animal species, various techniques such as enzyme-linked immunosorbent assay (ELISA), polymerase chain reaction (PCR), polyacrylamide gel electrophoresis (PAGE), and matrix-assisted laser desorption/ionisation time of flight mass spectroscopy (MALDI-TOF) have been studied, based on specific proteins, DNA and peptides.

The more 'classical' DNA based analysis based on PCR is able to detect the presence of cow, sheep or goat milk, but only when it is specifically looked for and when treatment of the sample has not lead to breakdown of the DNA protein into smaller fragments that can prevent detection with this technique. In this case, NGS should be considered because not only is it quick, accurate and relatively cheap, the true advantage is that all animal DNA will automatically be detected in one screen, usually referred to as 'untargeted'. Therefore, you will know if a milk sample is 100% of a specific animal species or if it is a mixture of milk with different animal species origin so for example cow's milk in sheep milk.

It should always be borne in mind that some traditional methods, such as the analysis of freezing point depression (FPD) remains a quick and reliable way of detecting even very small amounts of added water.

The main target markers of adulterants and the analytical methods which are widely used to analyse milk are summarised in Table 1.

ADULTERANTS	ANALYTICAL TECHNIQUES	TARGET MARKERS
Water	NIR	Water
Melamine	LC-MS/MS GC-MS/MS	Melamine
Urea	NIR, MIR	Urea
Whey	NIR, MIR	Whey
Vegetable oil	GC/ FID	Fatty acid profile
Cow's milk	ELISA PCR PAGE MALDI-TOF NGS	Whole bovine Bovine 12S rRNA Bovine para-κ-casein Protein components Animal species
Detergents	Rapid paper chromatography	Methylene blue dye-detergent complex
Hydrogen peroxide (H_2O_2)	Batch injection analysis (BIA) with amperometric detector	H_2O_2
Formaldehyde	HPLC/UV	Formaldehyde derived with 2,4-dinitrophenylhydrazine
Salicylic acid	HPLC/FLD	Salicylic acid
Benzoic acid	HPLC/UV	Benzoic acid

FUTURE PROSPECTS

In future, the emphasis will be on analytical techniques in the ongoing development of rapid methods for automated direct sample analysis. The "Electronic nose" is an example of new technology that is cheap, quick and easy. It has been widely used in dairy industry to check milk aging, shelf-life prediction, off-flavours and the geographic origin of milk. However, modification of the sensor for more specific toxic substances is still in the early stages. Nuclear magnetic resonance spectroscopy (NMR), a fairly traditional tool in the lab, is also proposed as a rapid method which can analyse a large number of adulterants in milk with highly reliable results. Nevertheless, its use is confined to a few food testing laboratories due to its high cost and the requirement of specialist or experienced staff to operate and maintain it.

AMORNPUN DAJSIRIPUN
Global Competence Support Centre
Food Specialist
Phone: +66 2683 0541 ext 2423
Email: Amornpun.Dajsiripun@sgs.com
SGS Agriculture and Food

SGS LAUNCHES CHINESE VISUAL TRUST INITIATIVE WITH CARREFOUR

Globally, consumers are becoming savvier when it comes to the items they put into their shopping baskets. Forward-thinking retailers need to be aware that customers now demand credible assurances regarding the quality and origin of their purchases.

Launched by Carrefour and SGS on July 1, 2017, as part of China's National Food Safety Week, the Visual Trust Initiative demonstrates how technology can be utilised to enhance the shopper's experience and fulfil consumer demands[1].

Unveiled in the presence of government officials, business associations, large retailers and the media, the Visual Trust Initiative is an end-to-end digital solution that allows Chinese shoppers to use their smartphones to access data concerning their chosen product's quality and origin. By simply scanning the product, consumers can access quality certificates, test results, locations and pictures of farms, as well as nutritional advice.

Developed by SGS[2] , with technology partners Transparency-One[3] and Blippar[4], this unique shopping experience gives consumers full supply chain transparency from farm to fork. As the world's leading testing, inspection and accreditation provider, SGS provides credible information on certifications, including data on sustainability.

Utilising Transparency-One's B2B platform, retailers and brand owners can access accurate global supply chain data including key product, supplier, and facility information, as well as analytics and geomaps. Finally, Blippar technology allows consumers to access this data in the shop. By leveraging advanced image recognition and computer vision, shoppers will simply scan their products to access relevant data, building consumer trust and enhancing the customer experience.

With the launch of the Visual Trust Initiative in China, Carrefour has set the standard for product transparency, which other retailers must follow. As the first global retailer to use this technology to enhance the consumer experience, it has taken the first step towards providing the answers modern customers demand, giving them full supply chain transparency from farm to fork.

For the complete range of SGS services and support visit www.foodsafety.sgs.com or send an email to food@sgs.com.

GEORGES LE NIGEN
SGS Transparency-One
Global Sales Manager
Phone: +33 6 28 50 26 82
Email: Georges.lenigen@sgs.com
in SGS Agriculture and Food

[1] *http://www.sgs.com/en/news/2017/09/carrefour-and-sgs-launch-visual-trust-in-china*
[2] *http://www.sgs.com/en/agriculture-food/food/transparency-one*
[3] *https://www.transparency-one.com/*
[4] *https://blippar.com/en/*

AGRICULTURE & FOOD TESTING IN MOROCCO

Operating since 2002, our agriculture and food testing laboratory in Casablanca, Morocco, was acquired by SGS in 2016, from Laagrima. It is one of two SGS agriculture and food laboratories in the city. From this lab we offer a diverse range of testing and analysis services to the country's agriculture and food industries.

Established:	2002
Employees:	29
Laboratories:	1
Laboratory space:	1,000 sq. m
Location:	Casablanca

Covering three floors, this lab includes dedicated zones for administration, physical, chemical and microbiological analysis.

SERVICES

Focused on microbiological, physical and chemical testing our Casablanca lab is staffed and equipped to deliver testing services for food and food products, including:

- Microbiological analysis:
  - Indicators, pathogens and spoilage organisms such as *E. coli*, *Salmonella, Listeria, Legionella, Staphylococci, Lactic flora*, *Clostridium perfringens*, Bacillus cereus, *Candida albicans*, yeasts, moulds, total aerobic count and sulphite-reducing anaerobes
- Physical and chemical analysis:
  - Contaminants: pesticide residues, heavy metals, veterinary drug residues, melamine, histamine, mycotoxins and PAHs, allergens
  - Nutritional analysis: vitamins, minerals, artificial colours, food additives, preservatives and sweeteners

In addition to analysis, we provide hygiene audits for agri-food processing facilities, restaurants, hotels, swimming pools and spas

Bacteriological analysis of food samples

PRODUCT CATEGORIES

In this rich agricultural region, we offer a testing and analysis services on the widest range of food product categories, including:

- Beverages – including juices and carbonated drinks
- Bottled water
- Canned fish
- Canned vegetables
- Confectionery and chocolate
- Cooked and ready-to-eat goods
- Dairy
- Fruit and vegetables
- Grains and cereals
- Herbs and spices
- Meat, poultry and seafood
- Oils and fats
- Pastry
- Processed and frozen foods
- Raw meat and seafood

ACCREDITATION

The laboratory has a testing scope accredited to ISO 17025.

Analysis of biochemical oxygen demand in wastewater

EXPERIENCE & EXPERTISE

Serving both Morocco and the wider region of North Africa, this lab is equipped with state of the art sampling, testing and analytical equipment. Our highly-skilled and experienced team of scientists have a reputation for delivering great service and the highest levels of accuracy.

KAOUTARE TACHFINE
Food Business Manager
SGS Morocco
Tel: +212 522 484 098
Email: Kaoutare.Tachfine@sgs.com
SGS Agriculture and Food

COMPARING GLOBAL FOOD SAFETY INITIATIVE (GFSI) RECOGNIZED STANDARDS

UPDATED GFSI WHITE PAPER

This updated white paper aims to provide an overview of the Global Food Safety Initiative (GFSI) and what it means for an international food safety standard to be GFSI approved. It then goes on to discuss each of the GFSI approved schemes individually looking in detail at the key schemes which are offered by BRC, FSSC 22000, IFS Food, SQF Code, and Global G.A.P. For each of these, the requirements, benefits and certification processes are reviewed. There are five further schemes that are covered in brief. The most generic of the schemes and those most commonly adopted by branded goods manufacturers (FSSC 22000, BRC, SQF Code and IFS) are then compared, by discussing the criteria, similarities and differences between the schemes. It also includes a brief overview of alternative programmes that support small and medium sized businesses by providing a steppingstone prior to full GFSI food safety certification. The paper then looks at the merits of a customised single food audit and elaborates on the benefits using a case study as an example. The case study highlights how food safety standards have an extensive crossover with environmental, health & safety and quality standards; and although there is rarely one 'optimal fit' food safety standard for any given organisation, a combination of schemes brought together in one audit procedure may be a suitable solution.

Download your copy of: Comparing Global Food Safety Initiative (GFSI) Recognised Standards

OUR WHITE PAPERS – LEARN MORE ABOUT FOOD QUALITY, SAFETY & SUSTAINABILITY

UNDERSTANDING GLOBAL OLIVE OIL QUALITY, GRADING AND LABELLING REQUIREMENTS

The olive oil industry faces increased pressure to prove that its products live up to the quality and origin on the bottle. Consumers are now more aware than ever, that olive oils may not always be what is claimed or advertised. Recent poor harvests and increasing demand for olive oil once again raise the risk of olive oil adulteration or fraud for short-term financial gain. To protect olive oil's longterm reputation, all those involved in the supply chain must remain vigilant at this time against such activity – and ensure consumer confidence and demand for olive oil remains high. The purpose of this white paper is to provide an overview of the voluntary industry standards and government/ state regulations relating to olive oil. It aims to promote an understanding of the grading, quality, regulatory and labelling requirements of the industry, and to outline some of the current issues relating to adulteration and contamination.

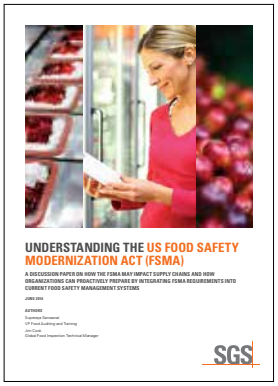
Download your copy of: Understanding Global Olive Oil Quality, Grading and Labelling Requirements White Paper

UPDATED WHITE PAPER: UNDERSTANDING THE US FOOD SAFETY MODERNIZATION ACT (FSMA)

This updated document introduces the Food and Drug Administration (FDA) Food Safety Modernization Act (FSMA) and how the finalized rules are likely to impact the food industry. The key provisions are detailed and compared against current industry-standard GFSI-recognized schemes.

Advice is provided on how to prepare to meet the FSMA requirements, including a step-by-step process guide. This is further developed by a comparison with, and discussion around, Global Food Safety Initiative recognized schemes and the simpler move from these certifications to complete preparedness for FSMA compliance.

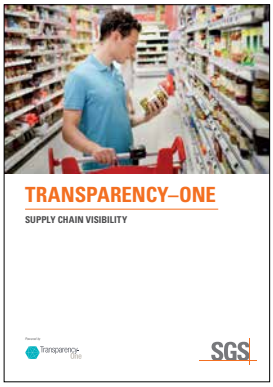
Download your copy of: Understanding the US Food Safety Modernization Act



TRANSPARENCY-ONE : SUPPLY CHAIN VISIBILITY

This white paper discusses the profound transformation taking place in food shopping and shopper behaviour, and the challenges in monitoring the supply chain and measuring product compliance to drive consumer trust. This document aims to promote understanding of the tool, the risk factors that drive supply chain compliance today and how it can be computed in a way that allows organisations to adapt quickly to improve supply chain quality and safety.

Download your copy of: Transparency-One: Supply Chain Visibility



UNDERSTANDING, MONITORING AND MEETING THE DIFFERING GLOBAL MAXIMUM RESIDUE LIMITS (MRLS) FOR PESTICIDES IN FOOD AND FEED PRODUCTS

The purpose of this white paper is to provide an overview on current thinking within the food industry for how best to manage pesticide residue risk in food products and supply chains. The aim is to promote an understanding of the origins of pesticide residues, and current industry challenges due to increasing regulations for the management and compliance of products destined for the EU, US, China and Japan.

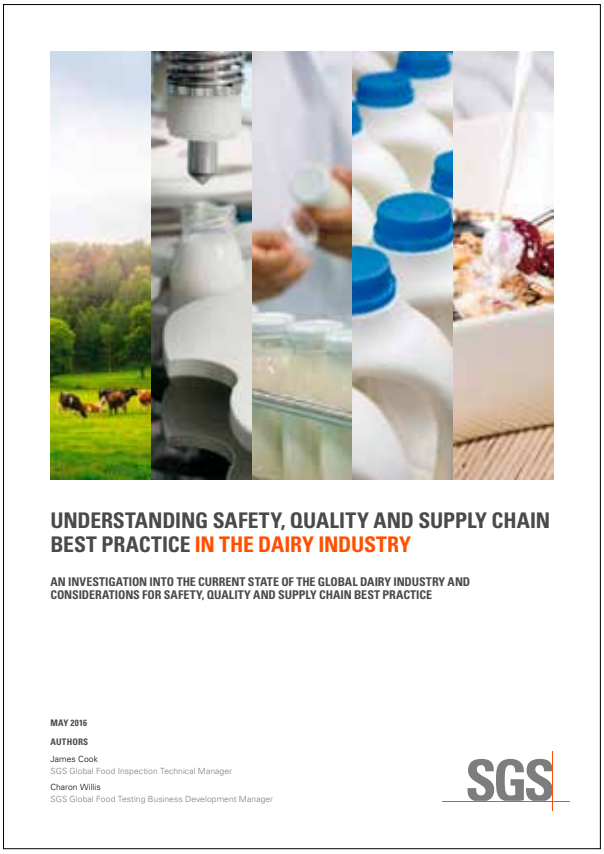
This paper is aimed equally at those organisations with established pesticide residues risk control and management plans as well as those considering development and implementation of risk protocols.

Download your copy of: Understanding, Monitoring and Meeting the Differing Global Maximum Residue Limits (MRLs) for Pesticides in Food and Feed Products White Paper

SGS WHITE PAPER: UNDERSTANDING SAFETY, QUALITY AND SUPPLY CHAIN BEST PRACTICE IN THE DAIRY INDUSTRY

HOW DO YOU DELIVER TRUSTED DAIRY PRODUCTS IN A GLOBAL MARKETPLACE?

Reports of *Listeria* outbreaks in US ice cream, detergents linked to Indian milk, and *Botulism* scares in Chinese milk powder due to New Zealand imports – all media headlines that make consumers question the safety of dairy products. In order to retain, or in some cases regain, consumer trust in the dairy industry you need to stay informed on the complex mix of issues and risks. To save you time and research, SGS' new white paper investigates the wide range of issues currently facing the dairy industry, and provides in-depth commentary to help you better understand the most important topics requiring monitoring and testing.



Topics covered in the SGS white paper: Understanding Safety, Quality and Supply Chain Best Practice in the Dairy Industry include:

- State of the Global Dairy Industry: Is the dairy industry experiencing a 'market imbalance' today? Where are tomorrow's future import/export markets? Find out in this chapter.
- International Standards and Regulations: Could a Codex standard for 'whey permeate' mean new growth for an underutilised product? What are the Codex Alimentarius Commision (Codex) and International Dairy Federation (IDF) standards and regulations for the dairy industry? Examine the main guidance steering dairy worldwide in this chapter.
- Safety and Quality Issues in the Dairy Industry: How do farmers really use antibiotics? Does dairy really contain what it claims on the packet? Has the rise of raw milk lead to an increase of pathogenic bacterial contaminates? Is packaging a source of mineral oil migration? Learn the answers to these questions and more in this chapter.
- Consumer Health and Wellbeing: Milk – the number one self-reported food allergen? When a product claims 'lactose-free' what does it mean? Is 'organic' driving dairy fraud? In this chapter discover how to reassure and keep consumers safe.
- Best Practices in the Dairy Supply Chain: Does your organisation operate without a supply chain management tool? How can a 360-degree quality, safety and compliance programme become reality? What are the 'top resilience' improvement factors? Get to grips with the fundamentals of supply chain security in this chapter.
- Global Dairy Consumption, Import and Export: Biggest exporters? Largest importers? What are the product categories set for growth? Get all the facts and figures of the global dairy industry in this chapter.

Download your free copy here

For more information contact:

CHARON WILLIS

Global Food Testing Business Development Manager
Phone: +44 203 008 7860
Email: Charon.Willis@sgs.com
SGS Agriculture and Food

JIM COOK

Global Food Inspection Technical Manager
Phone: +1 973 461 1493
E-mail: James.Cook@sgs.com
SGS Agriculture and Food

SGS WEBINARS

For a complete list of SGS seminars, courses and webinars, please check our events calendar.

WEBINAR	LANGUAGE	WEBINAR STATUS & LINK
GFSI Food Defense & Intentional Adulteration in FSMA	EN	Live October 17 - Register Now
FSMA Foreign Supplier Verification Program Rule Requirements	EN	On-demand
Exploring Key Changes in Issue 3 of BRC Storage & Distribution	EN	On-demand
What's New in Version 4 of FSSC 22000?	EN	On-demand
"FSMA Requirements for Animal Feed and Pet Food Companies - Tips for Successful Implementation"	EN	On-demand
Gluten-Free Certification and Gluten Risk Management	EN	On-demand
Food Defense: Update on Current Guidelines and Future Trends	EN	On-demand
Supply Chain Risks: Why Transparency Matters	EN	On-demand
Integrating FSMA with Exisiting Food Safety Systems	EN	On-demand
BRC Packaging	EN	On-demand
BRC Issue 7	EN	On-demand
BRC Agents and Brokers	EN	On-demand
Global Halal Certification: Key Trends, Challenges and Opportunities	EN	On-demand
Kosher Certification: Trends, Challenges and Opportunities	EN	On-demand
Exploring Version 2 of IFS Cash and Carry	EN	On-demand
FSMA and the Global Supply Chain - Compliance Strategies and Smart Technologies for Managing Regulatory Data	EN	On-demand
Halal Requirements for the UAE	EN	On-demand

UPCOMING SGS FOOD EVENTS

For more events, please check the online events calendar.

EVENT	COUNTRY	LOCATION	DATES	EVENT TYPE	STAND #
Global Aquaculture Alliance GOAL Conference	Ireland	Dublin	October 3-6	Conference	N/A
Gulfood Manufacturing	UAE	Dubai	Oct 31 - Nov 2	Tradeshow	S1-C51
China International Food Safety and Quality Conference	China	Beijing	November 1-2	Conference	B16
China Fisheries and Seafood Expo	China	Qingdao	November 1-3	Conference	E1-1418
SQF International Conference	USA	Dallas, TX	November 7-9	Conference	TBC
Food Safety Consortium	USA	Schaumberg, IL	Nov 28 - Dec 1	Conference	TBC
NLS Food Quality Symposium	USA	Indian Wells, CA	December 4-6	Summit	TBC

SAFEGUARDS

SafeGuards, are SGS technical bulletins concentrating on new product standards, regulations and test methods.
Subscribe to SafeGuards: www.sgs.com/ConsumerSubscribe
Browse the SafeGuards Library: www.sgs.com/safeguards

THE LATEST SAFEGUARDS

- EU Amends Proposal for BPA in Food Contact Materials and Articles – view
- French Court Rules on Penalty for Food Contact Product Safety Failure – view
- EU Updates the Use of Butane, Isobutane and Propane in Color Preparation – view
- India Revises Food Fortification Regulation – view
- Republic of South Africa Amends Pesticide MRLs for Foodstuffs – view

FOR ENQUIRIES

Please contact:
food@sgs.com

WWW.SGS.COM

WHEN YOU NEED TO BE SURE

SGS