

HOT

SOURCE

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MANAGING FOOD CONTAMINANT REGULATIONS IN INTERNATIONAL MARKETS

WHAT AM I DRINKING? BEATING THE ALCOHOLIC BEVERAGE COUNTERFEITERS

EUROPEAN UNION ADOPTS NEW RULES FOR PRIMARY INGREDIENT LABELING ON FOOD PRODUCTS

QUALITY ASSURANCE FOR SPORTS NUTRITION PRODUCTS

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FSMA VQIP OR FSMA FSVP?

SGS



DEAR READER

Welcome to Hot Source, your essential guide to some of the hot topics in the food sector. In this issue our experts look at isotope analysis, labeling, sports nutrition, FSMA certification and managing food contaminant regulation data.

Fighting food fraud, we look at alcoholic beverages and the ways in which isotope analysis can be used to verify authenticity and beat the counterfeiters.

Labeling of food products is a recurring industry theme. In this issue we explore new food ingredient labeling rules in the EU that require food operatives to indicate the country of origin or place of provenance of the primary ingredient of a foodstuff, due to take effect from April 1, 2020. In a second article we look at the issues raised by manufacturers of traditionally harvested animal products who are seeking labeling rules to distinguish their products from those made from animal cell cultures and vegetarian alternatives.

In 2017, the global sports nutrition market size was estimated at USD 11.64 billion and predicted to grow rapidly. We describe the variety of sports nutrition products and explain the importance of maintaining quality.

As FSMA certification grows in popularity, one of the first steps for facilities pursuing certification is to choose between the two FSMA schemes – which can be a difficult decision. Read on for our guide to making the right choice.

And finally, as the regulatory burden continues to grow we review the SGS Digicomply platform’s new ‘Restricted Substances’ module – the simplest way to monitor global MRLs and stay compliant.

SGS Food Team

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CONTAMINANTS

MANAGING FOOD CONTAMINANT REGULATIONS IN INTERNATIONAL MARKETS

The biggest challenge for manufacturers selling raw agricultural products and processed food in global markets is the need to comply with many different regional regulations concerning maximum residue limits (MRLs). This is made more difficult by the fact that besides CODEX, there are no standardized international rules, only guidance for specific food items or groups that includes ‘recommended MRLs’.

The establishing of MRLs is generally left to individual countries, which must create different MRLs for each of hundreds of restricted substances and the numerous food products that can be contaminated. The resulting international MRL lists are therefore extremely long, containing thousands of MRLs for each country. For example, simply looking at the MRL rules for apples in three territories shows the potential for complexity. (see table 1)

To ensure continued access to international markets and avoid the repercussions associated with non-compliance, food operatives need to simplify the process of monitoring everchanging international food regulations.

RESTRICTED SUBSTANCES

SGS has added a new functionality to its Digicomply content management platform – ‘Restricted Substances’. This specialist function supports businesses around the world as they monitor international MRL information.

Restricted Substances provides constant horizon scanning of global regulations, returning information on over 175,000 substances in more than 40 countries. This function also provides valuable data on other contaminant limits, including veterinary drug MRs, mycotoxins and heavy metals. Results are summarized in comparison tables that let operators easily extract and

Food producers are under increasing pressure to satisfy demand from a growing global population. Concurrently, they must ensure their products comply with progressively more complex international food safety regulations. How can food operatives simplify regulatory monitoring while ensuring their products remain compliant?

SUBSTANCES	CANADA	JAPAN
Teflubenzuron CAS RN: 83121-18-0	0.3 ppm Muscle of salmonids	No Limit Defined Muscle of salmonids
	No Limit Defined Salmoniformes	0.5 ppm Salmoniformes
	3.2 ppm Skin of salmonids	No Limit Defined Skin of salmonids

Table 2

evaluate potential impacts on supply chains, allowing immediate corrective actions.

Utilizing Restricted Substances on SGS Digicomply gives food manufacturers and suppliers instant access to relevant information on any restricted substance. In addition, it provides a fully translated regulation text in English, alongside the original transcript, to allow further investigation.

Companies selling on international markets need a simplified data gathering tool that they can trust to keep them ahead in a constantly evolving regulatory landscape. Restricted Substances adds critical functionality to their compliance risk mitigation procedures. Discover more about restricted substances [here](#).

CASE STUDY: MOWI

Formally Marine Harvest, Mowi is the world’s largest producer of Atlantic salmon. It supplies farmed salmon to more than 70 markets and, like all global seafood players, is challenged by the everchanging regulations and standards enforced around the world.

Mowi has chosen to work with SGS Digicomply to ensure its products remain compliant in each of the 70 markets. It utilizes Digicomply to find and update individual requirements,

allowing them a better understanding of the specifics required for salmon in each territory. (see table 2)

Read the full case study [here](#) for more insights.

SGS SOLUTION: DIGICOMPLY

SGS Digicomply is a powerful content management platform that combines high technology with the expertise of SGS food compliance teams. It sorts and classifies huge volumes of global compliance data, creating a single, coherent and reliable source of useful information for food operatives.

Digicomply delivers insight into the regulatory development process, supports decision-making and ensures security and efficiency as a single point-of-data. For food manufacturers and suppliers looking for risk mitigation in an increasingly regulated world, SGS Digicomply offers end-to-end solutions that improve compliance processes, wherever they are operating in the world.

Want to learn more? Register for free at www.digicomply.com

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

SUBSTANCES	CHINA	UNITED STATES	EUROPEAN UNION
Abacmentin: CAS RN: 71751-41-2	0.02mg/Kg	No Limit Defined	0.01 mg/Kg
Acetamiprid: CAS RN: 135410-20-7	0.08 mg/Kg	No Limit Defined	0.08 mg/Kg
Acibenzolar-S-methyl: CAS RN: 135158-54-2	No Limit Defined	0.05 mg/Kg	0.01 mg/Kg

Table 1

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FOOD FRAUD**WHAT AM I DRINKING? BEATING THE ALCOHOLIC BEVERAGE COUNTERFEITERS**

Alcoholic drinks containing the best ingredients, produced using traditional methods, and/or in a specific geographical region, will command a premium price, leaving the door open for fraudsters to benefit from counterfeiting.

Fermented grape juice, commonly referred to as wine, is highly regarded by many societies. The production of wine, including what can be added, is tightly controlled in many regions because geographical origin is one of the defining characteristics consumers traditionally look for when buying a bottle.

Until recently there has been little global harmonization of standards. The International Organization of Vine and Wine (OIV) and other bodies have now begun to push for greater coordination, but there are still regional differences about what can and cannot be added to wine.

Because geographical origin is so important to wine buyers, and some regions command a premium price, criminals are encouraged to initiate fraud, which can take several forms, including mislabeling, blending and adulteration. In 2016 and 2017, an investigation into 743 wine importers, distributors, retailers, and hospitality establishments found 22% and 15% of firms held wines where the contents were misrepresented on the label.

Ensuring of the authenticity of wine and other alcoholic beverages is therefore very important for businesses wishing to avoid financial repercussions, loss of reputation, and legal censure.

TYPES OF WINE ADULTERATION

Perhaps the oldest form of adulteration is dilution with water. Once a common practice, this is now considered to be fraud, but it is still done for two reasons:

1. To reduce high alcohol content below a threshold value to avoid high duties and taxes
2. To increase volume

Sugar may be added to unfermented grape must (chaptalization) to create a higher alcohol content, and thereby higher valued wines. In addition, wines with low alcohol levels may be unstable, so adding sugar before fermentation can be vital for the vintage. This process is legal in some regions and vintages, for example if there has been minimal sun during the grape-ripening period. Most wine-producing regions, however, ban chaptalization. It is also completely illegal to add raw alcohol to wine for the same purposes and wine-producers should not add sugar to dry wines to make them sweeter (producing sweet wine is more expensive).

Glycerol is sometimes fraudulently added to wine to disguise poor quality. After water and ethanol, glycerol is the abundant compound in wine. It contributes to mouthfeel properties and smoothness because it is colorless, odorless and has little noticeable flavor but is syrupy.

Acidity is important in wine. At sufficient levels it helps with aging, stability and the organoleptic properties of the final product. L-tartaric acid is the main organic acid responsible for acidity in wine, but this is generally lower in more mature grapes, which may therefore require acidification during production. L-tartaric acid is a natural byproduct of the wine industry, but it can also be made from fossil fuels and extracted from certain plants. The International Wine Code does regulate the use of L-tartaric acid, stating only that which is sourced from grapes can be used.

Finally, bubbles are obviously a major component of sparkling wines. Traditionally, the bubbles are created during a second fermentation in the bottle or tank. The CO₂ in the bottle therefore reflects the botanical origin of the sugars from which the gas originated. Carbonation by direct injection of 'food grade' CO₂ is possible, but EU legislation forbids the use of any exogenous carbonic anhydride in semi-sparkling and sparkling quality wines.



ENSURING AUTHENTICITY

The authenticity of a wine can be ascertained using stable isotope ratio analysis, looking at different substances. For example, when looking for adulteration by meteoric-(tap)-water, the laboratory can look at the water oxygen isotopes ($^{18}\text{O}/^{16}\text{O}$). The principle is that the $^{18}\text{O}/^{16}\text{O}$ is higher in fruit (grape) water, although, because of natural geographical variations, it is necessary to use an internal parameter for correlation, such as the alcohol $^{18}\text{O}/^{16}\text{O}$.

To detect added sugar or ethanol, the testing facility will look for the isotope ratios of the compounds carbon ($^{13}\text{C}/^{12}\text{C}$) and hydrogen ($(\text{D}/\text{H})_i$, $(\text{D}/\text{H})_a$). Different plants have different ratios, which will then allow the detection of sugars derived from cane, beet, corn syrup, etc., and added ethanol.

The addition of glycerol is detected by looking at its carbon isotopes ($^{13}\text{C}/^{12}\text{C}$). Naturally wine-derived glycerol differs significantly from the much cheaper synthetic alternative. Glycerol from other sources (e.g. plant sources) can be detected by using the carbon isotope composition of ethanol as an internal parameter for comparison.

To detect the source of tartaric acid, testing laboratories use multi-isotope fingerprinting ($^{13}\text{C}/^{12}\text{C}$, $^{18}\text{O}/^{16}\text{O}$, $^2\text{H}/\text{H}$) of the tartaric acid present in wine. The principle is that the multi-isotope fingerprint of tartaric acid from grapes differs significantly from synthetic tartaric acid and other plant-derived forms.

Finally, the source of carbon dioxide in sparkling wine can be identified using carbon ($^{13}\text{C}/^{12}\text{C}$) stable isotope ratio analysis of the CO_2 in the wine. Scientists will look to see if the carbon

isotope ratio of CO_2 in the bottle reflects the botanical origins of the wine. CO_2 derived for alternative sources and then injected into the wine will differ greatly.

GEOGRAPHIC VERIFICATION

The same principles used in isotope analysis can also be utilized to establish geographical origin. The European Union (EU) has created a database for monitoring, amongst other things, geographical origin for certain countries. Stable isotope ratio analysis is used to create a multi-isotope fingerprint ($^{18}\text{O}/^{16}\text{O}$, $^2\text{H}/\text{H}$, $^{13}\text{C}/^{12}\text{C}$), indicative of the characteristics of the region of wine production. If the wine inside the bottle differs from that which is advertised on the outside, with reference to the reference dataset, it is clearly a case of fraud.

OTHER ALCOHOLIC DRINKS

The potential gains made by fraudsters with wine are also seen in other alcoholic beverages. The EU's Intellectual Property Office has estimated counterfeit spirits cost the European economy €2.8 billion and, in just one year, Interpol and Europol seized 26.4 million liters of counterfeit alcohol, estimated at €230 million. In February 2018, Mexican police seized 20,000 gallons of black-market tequila, with over 200 gallons containing dangerous levels of methanol, destined for resorts catering to North American tourists.

Fraudsters are attracted by the ability to use cheaper raw ingredients and practices to replicate products that sell for a premium price. As with sparkling wines, the addition of carbon dioxide or sugar to ciders, perries and hydromels in the EU means they cannot

be considered genuine and will not command the premium price. In the US, carbonation is allowed.

As with wine, stable isotope ratio analysis can be used to verify the authenticity of a product. The source material of the alcohol, natural carbonation and provenance, can all be verified by looking at particular compounds. Applications include (product, compound, detection):

- Beer: CO_2 – industrial CO_2 , also for alcohol free beers
- Beer: ethanol – source material of the alcohol
- Ciders: ethanol – added sugar and CO_2
- Tequila: ethanol – verify blue agave as botanical origin
- Rum: ethanol – verify sugarcane as botanical origin
- Vodka: ethanol – addition of alcohol from sugarcane or corn

STABLE ISOTOPE RATIO ANALYSIS

SGS offers a comprehensive range of services to help alcoholic beverage manufacturers and suppliers ensure their products match the description on the label. Using stable isotope ratio analysis, their experts can help identify counterfeit products, detailing the form of the corruption.

FOOD FRAUD SURVEILLANCE

SGS DigiComply offers a dedicated database to global food fraud surveillance. This platform is constantly updating and aggregating facts from the most relevant sources, such as trade associations, governments, media and scientific institutions. Knowing your materials, ingredients and their associated risks is an essential part of the vulnerability assessment as prescribed by food safety certification schemes.

For the complete range of isotope analysis services visit www.sgs.com/fingerprinting or send an email to food@sgs.com.

Sign-up for free to [SGS DigiComply](#) to setup your own regulatory monitoring and receive updates about Labelling regulations.

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LABELING

EUROPEAN UNION ADOPTS NEW RULES FOR PRIMARY INGREDIENT LABELING ON FOOD PRODUCTS

Country of origin labeling for foods may mislead consumers if the primary ingredient originates elsewhere. To rectify this, the European Union (EU) is implementing new rules that must be applied from April 1, 2020.

On May 28, 2018, the EU adopted Implementing Regulation (EU) 2018/775. This delineates the rules for the application of Article 26(3) of Regulation (EU) No 1169/2011 regarding primary food ingredient labeling.

REGULATION NO 1169/2011

Article 26 of Regulation (EU) No 1169/2011 requires food operatives to indicate the country of origin or place of provenance of the primary ingredient of a foodstuff. This is mandatory, when by omitting the information a consumer might be misled (Point 2.a). Point 3 requires the food business operator to provide a food's country of origin and, where this differs of the food's primary ingredient, "either the country of origin of the primary ingredient or an indication that the country of origin of the primary ingredient is different to the country of origin of the food."

The regulation defines 'country of origin' as:

"Goods wholly obtained in a single country or territory shall be regarded as having their origin in that country or territory and goods the production of which involves more than one country or territory shall be deemed to originate in the country or territory where they underwent their last, substantial, economically justified processing or working, in an undertaking equipped for that purpose, resulting in the manufacture of a new product or representing an important stage of manufacture."

'Primary ingredient' is defined as:

"An ingredient or ingredients of a food that represent more than 50% of that food or which are usually associated with the name of the food by the consumer."

IMPLEMENTING REGULATION (EU) 2018/775

To enforce EU Regulation No 1169/2011, Implementing Regulation (EU) 2018/775 came into force on June 1, 2018, and will be applicable from April 1, 2020. This provides stakeholders with clarification on how the origin of primary ingredients should be labeled when it is different from the given origin of the food.

(EU) 2018/775 states that the country of origin or the place of provenance of the primary ingredient, when it differs from the same information for the food, shall be given:

- a) With reference to one of the following geographical areas:
 - i. 'EU', 'non-EU' or 'EU and non-EU'; or
 - ii. Region, or any other geographical area either within several Member States or within third countries, as defined as such under public international law or well understood by normally informed average consumers; or
 - iii. FAO Fishing area, or sea or freshwater body if defined as such under international law or well understood by normally informed average consumers; or
 - iv. Member State(s) or third country(ies); or
 - v. Region, or any other geographical area within a Member State or within a third country, which is well understood by normally informed average consumers; or
 - vi. The country of origin or place of provenance in accordance with specific Union provisions applicable for the primary ingredient(s) as such

b) Or by means of a statement as follows:



'(name of the primary ingredient) do/ does not originate from (the country of origin or the place of provenance of the food)' or any similar wording likely to have the same meaning for the consumer

This will provide consumers with a high level of transparency on the origin of their food products. It will also help to harmonize the presentation of this information, whilst allowing a certain level of flexibility for food business operators in order to consider the various processing methods involved in the production of their food products. Isotope analysis can be used to help verify geographical origin claims as discussed in our previous article "[Verification Of Geographical Origin By Stable Isotope Analysis](#)".

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

Sign-up for free to [SGS Digicomply](#) to setup your own regulatory monitoring and receive updates about Labelling regulations.

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HEALTH FOODS

QUALITY ASSURANCE FOR SPORTS NUTRITION PRODUCTS

In 2017, the global sports nutrition market size was estimated at USD 11.64 billion, with projections it will grow around 9.7% by 2024. Manufacturers need to be sure products are safe and conform to stated quality parameters.

WHAT ARE SPORTS NUTRITION PRODUCTS?

The European Specialist Sport Nutrition Alliance (ESSNA) defines sports nutrition as:

“Products designed for and used by athletes, exercisers and sportsmen to improve their nutritional intake and/or some aspect of health, wellbeing, performance, muscle growth and/or recovery from exercise.”

Most products are formulated using natural ingredients, including egg and dairy proteins, fibers, sugars and vegetable starches, vitamins and minerals, and other non-essential ingredients (e.g. herbs).

Athletes need the right nutrition. Gender, the type of sport, and the intensity of training, will affect the type of sports nutrition products athletes use.

CHOOSING THE RIGHT PRODUCT

This can be very difficult, depending on several factors including the type of sport and whether it is leisure-based or competitive. Basic divisions are:

- Endurance sports – e.g. marathon running, triathlon
- Resistance & strength training – e.g. weightlifting
- Track & field and martial arts – e.g. sprinting, swimming, boxing, long jump
- Team sports – e.g. basketball, badminton, soccer, hockey

When choosing a sports nutrition product, the athlete must consider energy. High performance sports will use considerably more energy, but consumption will fluctuate depending on whether the athlete is competing or just training.

Endurance athletes must consider their intake of carbohydrates, which will have a major effect on results. Protein usage also differs depending on age and body weight, and the type of sport. Amino acids are required to form protein structures and help develop muscle tissue. Stamina sports, e.g. triathlons and weightlifting, need dietary fat for energy. Finally, athletes use, and

therefore require, more vitamins than non-sportspeople.

Sports nutrition products are also a good way to replace the water, minerals and trace elements lost during sweating.

Manufacturers have developed a range of products to help athletes meet their goals:

- Weight management products
- Muscle core products
- Energy boosting products for pre and post exercise
- Isotonic beverages for regeneration
- Nutritional products, including supplements

Dosage forms include powders, granulates, liquids, capsules, tablets, drops, bars, instant drinks and gels, and the products come in a variety of packaging types.

Finally, pricing is dependent on the ingredients. These may include minerals/trace minerals, proteins, protein concentrates, amino acids, carbohydrates, botanicals, and special targeting ingredients (e.g. for the immune system, bones and joints, etc.).

QUALITY AND SAFETY

Comprehensive quality assurance helps stakeholders ensure their products meet legal requirements and satisfy customers. Using state-of-the-art analysis techniques, this has two parts:

1. Continuous monitoring of quality parameters to ensure:
 - Advertised nutrient levels are correct
 - Minerals/trace elements/vitamins comply with legal requirements
 - Declared nutritional values are observed (including fatty and amino acids)
2. Contamination checks:
 - Microbial contaminants
 - Pesticide residues
 - Allergens
 - Genetically modified organisms (GMO)
 - Chemical contaminants – heavy metals, pyrrolizidine alkaloids, MCPD and its esters, and mineral oil residues (MOSH/MOAH)

SHELF LIFE

Manufacturers and suppliers also need to be sure products meet quality standards until the best before date. This is a legal requirement.

Nutrients may degrade during storage however, so testing is required to ensure degradation is within permissible tolerances and microbiological stability is maintained. Special testing methods can simulate long storage, following which products can be tested to ensure they match advertised quality parameters. Packaging should also be tested to ensure it isn't adversely impacting the product.

SGS SOLUTIONS

SGS provides a comprehensive range of services to help manufacturers and suppliers of sports nutrition products comply with relevant safety and quality requirements.

We offer consultancy and testing services for all sports nutrition products, including:

- Dietary supplements
- Balanced diet products
- Weight-control products, either daily ration or meal replacement

With a worldwide network of auditors, we provide a range of certifications including HACCP, SQF, IFS, BRC and, FSSC 22000, and we offer a range of supplementary services, including training, package evaluation, label reviews, export checks, and consultations to help with quality assurance and product development.

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

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AUTHENTICITY

ADVANCES IN TESTING GIVE ASSURANCE ON SEAFOOD SPECIES AUTHENTICITY

As demand for seafood surges worldwide, companies along the supply chain are under greater pressure to prove the safety and origin of their produce. The very latest technology is being adopted to identify the species found in finished products, with the ultimate aim of providing transparency and reassurance to the consumer.

The fast-growing global seafood industry is under close scrutiny from consumers after recent concerns about labeling and the discovery of the use of cheaper substitutes. High standards are expected and so transparency in the supply chain is becoming increasingly important. With updated and amended regulations becoming tighter, the demand for analytical testing in the seafood industry to prove safe and authentic products is growing.

UNPRECEDENTED GLOBAL DEMAND

Average annual consumption of seafood per person worldwide increased from 19.3 kg to 20.5 kg between 2014 and 2017. This rate has more than doubled in the past 50 years due to a shift in consumer preference and a better understanding of the health benefits of eating seafood, including that it is a good source of high quality protein and other essential nutrients, particularly omega-3 fatty acid. However, mislabeling and species substitution (using cheaper alternatives) are widespread throughout the industry and have led to product recalls which have seriously impacted brand reputation and the reputation of the food industry as a whole. It has also contributed to an increase in the risk to health due to allergies.

In more recent years, consumers have shown a growing awareness and rising concern for what they are purchasing, including how, where and when their seafood was harvested and or produced. These concerns are a driving force for enacting legislation and developing traceability systems to assess quality and safety throughout the seafood supply chain. Increasingly, analytical testing at various stages of the supply chain is used to ensure that products are authentic and safe.

STATE-OF-THE-ART TECHNOLOGY FOR SPECIES IDENTIFICATION

The following techniques use the latest developments in technology and are now found regularly in the seafood industry to identify origin of products, ensure accurate labeling and to reduce the risk of allergic reactions.

Molecular Technique

Fisheries and aquacultures are heterogenous in term of species and food products. With the high perishability of seafood it is often processed before reaching the consumer. Because of this it potentially creates a situation of species substitution, which is difficult to morphologically distinguish. Deoxyribonucleic acid (DNA)-based polymerase chain reaction (PCR) methods, including DNA sequencing, restriction-fragment length polymorphism (RFLP), randomly amplified polymorphic DNA (RAPD), multiplex-PCR, quantitative PCR (qPCR), and simple sequence repeats (SRR) or micro-satellites^[1] are widely used to identify seafood species. However,

these methods are limited to detect only known DNA sequences, are cost intensive, and time consuming.

These constraints can be overcome by using Next Generation Sequencing (NGS). This innovative technique, which looks at DNA-based content, is now frequently used and has the significant benefit of allowing the identification of multi-species in complex/mixed samples, or even in the case of closely related species, simultaneously. NGS is now the standard approach in the food inspection field.

Proteomic Technique

DNA integrity can be damaged as a result of processing, such as acidification and thermal treatment when producing finished products. When tested, this can lead to non-specific identification. Thus, a proteomic tool obtained by matrix-assisted laser desorption/ionization – time of flight mass spectrometry (MALDI-TOF MS) – can be introduced as an alternative technique.





This method involves characterizing protein and peptide patterns for seafood authenticity and then comparing them with a database of spectral libraries of individual species. With automated data acquisition and powerful bioinformatic processing, the proteomic technique takes advantage of high-throughput capability, speed, sensitivity, and robust quantification^[2].

Parvalbumin (PRVB) isoform can be selected as a key for a protein marker for fish species identification^[3]. This biomarker is applicable for:

- (i) Identification if any member from the Merlucciidae family is present in the sample
- (ii) Discrimination between the genera Merluccius
- (iii) Classification of hake species into two groups according to their geographic distribution: American hake or Euro-African hake, and
- (iv) Finally, the combination of the presence/absence of eight other peptide biomarkers allowing the unambiguous identification of any specific species from the Merlucciidae family

PRVB is not only interesting as the

protein biomarker, is also considered the major fish allergen. Therefore, analysis targeting this protein has a double application – both for species identification and for food safety purposes^[4].

Lipidomic Technique

Besides proteomic, lipidomic analysis reveals the phospholipid profile for fish authenticity and is increasingly studied using multiple analytical techniques, including nuclear magnetic resonance (NMR) spectroscopy, gas chromatography (GC) and liquid chromatography (LC) mass spectrometry, etc. The multidimensional mass spectrometry-based short gun method is one of the main analytical platforms in current lipidomic studies.

Nevertheless, the experimental operation of these methods is complicated, laborious, and time consuming. A more recent innovation applies rapid evaporative ionization mass spectrometry (REIMS) with an intrinsic coupled intelligent knife (iKnife). This technology is based on the production of gaseous ions, mostly from fats/lipids and especially phospholipids. This has been used in routine clinical trials and more recently has been extended to identify food authenticity because it offers real time analysis and without the need for sample preparation^[5].

Recently, Song et al. developed and optimized a method by using the REIMS system with iKnife to discriminate between salmon and rainbow trout^[6]. This efficient method is in urgent need due to claims that in China rainbow trout is often labeled as salmon. This particular case has aroused widespread attention because of the potential consumer health impact; rainbow trout can be infected with fish parasites, which can induce human hepatic disease and

cholangiocarcinoma. REIMS continues to be studied for its potential to be used in other situations too, such as determining line-caught and trawler-caught seafood.

Demand for Stricter Control

Together, consumers, governments, and the food industry are demanding stricter control and tighter monitoring of seafood authenticity, along with its safety and quality.

The future of analysis for seafood authenticity depends upon NGS, proteomic, and lipidomic techniques. These require both reference databases and advanced statistical tools, such as Hierarchical cluster analysis (HCA), principle component analysis (PCA), and partial least squares (PLS) for result interpretation, whether the sample is likely a food fraud or not^[7].

The advances in technologies and instrumentations for seafood authenticity testing show promise, however issues of method validation and harmonization suggest they should be modified and refined at the laboratory stage prior to implementation in the industry. Furthermore, inter-laboratory comparisons and certified reference material should be addressed in order to guarantee the laboratory performance.

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

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REFERENCES:

- 1) Bohme K., Mata-Calo P, Barros-Velazquez J. et al. Review of recent DNA-based method for main food authenticity topic. *J. Agric. Food Chem.* (2019); 67: 3854-3864.
- 2) Verrez-Bagnis V., Sotelo C.G., Mendes R. Method for seafood authenticity testing in Europe. *Bioactive molecules in food* (2019); 2063-2117.
- 3) Carrera M., Canas B., Gallardo J.M. Fish authenticity. *Proteomics in foods: principles and applications* (2013); 205-222.
- 4) Elsayed S., Bennich H. The primary structure of allergen M from cod. *Scandinavian journal of immunology* (1975); 4: 203-208.
- 5) Black C. Chevallier O.P. Hauhhey S. et al. A real time metabolomic profiling approach of detecting fish fraud using rapid evaporative ionization mass spectrometry. *Metabolomics* (2017); 13 (153): 1-13.
- 6) Song G., Zhang M., Zhang Y., et al. In Situ method for real-time discriminating salmon and rainbow trout without sample preparation using iKnife and rapid evaporative ionization mass spectrometry-based lipidomics. *J. Agric. Food Chem.* (2019); 67: 4679-4688.
- 7) Fiorino G.M., Garino C., Arlorio M. et al. Overview on untargeted methods to combat food frauds: a focus on fishery products. *J. Food Qual.* (2018); 3: 1-13.

FOOD TRENDS

LABELING ANIMAL CELL CULTURE AND VEGETARIAN ALTERNATIVE FOOD PRODUCTS

The industry responsible for products using traditionally harvested animal ingredients is increasing pressure on regulators to introduce labeling rules that differentiate between their products and those generated from animal cell cultures and vegetarian alternatives.

In the United States and Europe, the vegetarian alternative industry has a long history of clearly labeling the source of ingredients in its products. The rapid development of animal cell culture technology has, however, made the animal product industry reevaluate its position regarding labeling. It is concerned that as vegetarian alternative and animal cell culture products start to taste like traditionally harvested animal products, the consumer will not know the difference. The industry is now demanding laws and regulations that will prevent this confusion.

UNITED STATES

In the US, 23 states have decided to protect certain products, with eight having now passed protection laws. These are:

1. **Missouri** – effective January 1, 2019, the law essentially requires that anyone selling a product not harvested from livestock or poultry but using the terms ‘meat’, ‘beef’, ‘chicken’ or ‘sausages’ in labels or advertising, will be fined USD 1,000 or receive a one-year jail sentence. This applies even if the product uses the terms vegetarian, vegan, etc.¹

2. **Arkansas** – House Bill 1407: “to require truth in Labeling of Agricultural Products that are edible by humans”. It restricts the terms ‘meat’, ‘meat products’, ‘pork’, ‘pork products’ and ‘poultry’ to animal harvested products. It also restricts the use of the word ‘rice’ to *Oryza sativa* L., *Oryza glaberrima* or wild rice. Infringements on labeling and advertising, for example cauliflower rice, will result in a USD 1,000 fine.²

3. **Mississippi** – effective July 1, 2019 per S2922: “A food product that contains cultured animal tissue produced from animal cell cultures outside of the organism from which it is derived shall not be labeled as meat or a meat food product. A plant-based or insect-based food product shall not be labeled as meat or a meat food product”.³

4. **North Dakota** – per H1400: food products made from cell cultures must be labeled accordingly. Packaging cannot be the ‘same’ or ‘deceptively similar’ to animal-based products so that they could, “mislead a reasonable person to believe the product is a meat food product.” If one does, it is considered adulterated.⁴

5. **South Dakota** – per S68: a product shall be considered misbranded if its label or brand intentionally misrepresents the product as a meat food product, meat by-product or poultry. This includes products derived whole or in-part from the animal.⁵

6. **Wyoming** – per S68: the terms meat and poultry are reserved for slaughtered animals and a manufacturer must clearly label cell culture products as ‘containing cell cultured product’ and clearly label plant-based products as ‘vegetarian’, ‘veggie’, ‘vegan’, ‘plant based’, etc.⁶

7. **Montana** – House Bill 327 – the ‘Real Meat Act’. Prevents cell culture derived products from using the terms ‘meat’, ‘poultry’, ‘hamburger’, ‘ground beef’, ‘beef patty mix’, etc.⁷

8. **Oklahoma** – per S392: terms ‘meat’, ‘poultry’, etc. can only be used for slaughtered livestock, to prevent both cell culture and plant-based products from being labeled as their animal counterparts.⁸

¹<https://legiscan.com/MO/drafts/SB627/2018>

²<https://legiscan.com/AR/text/HB1407/id/1963740>

³<https://legiscan.com/MS/text/SB2922/id/1948120>

⁴<https://legiscan.com/ND/text/1400/id/1948923>

⁵<https://legiscan.com/SD/text/SB68/2019>

⁶<https://legiscan.com/WY/text/SF0068/2019>

⁷<https://legiscan.com/MT/text/HB327/2019>

⁸<https://legiscan.com/OK/text/SB392/2019>



In addition, the US dairy industry is campaigning to restrict use of the terms 'milk', 'yogurt', 'cheese', etc. to dairy products. This would ban plant alternative products, for example oat milk, from using them. They contend that, while the vegetarian alternatives clearly indicate the product's source, the use of these terms is misleading because specific standards apply to them. The US FDA has requested the industry to use 'beverage' instead of milk and 'yogurt alternative' or 'cheese alternative'. These terms do, however, still use the dairy related names.

EUROPEAN UNION

On June 14, 2017, the European Union's Court of Justice ruled on the subject of labeling. More recently, however, on April 13, 2018 in France, Article 11 reserved the words 'steak', 'filet', 'bacon' and 'sausage' for animal products using beef and pork.⁹

Article 17 of Regulation 1169/2011 states, "information should be to enable consumers to identify and make appropriate use of food". Therefore, the names used for meat products and preparations should be reserved for animal products. This basically prohibits names like 'veggie burger' or 'veggie sausage', but it would allow 'veggie discs' or 'veggie tubes'.

Much of the European debate does not seem to be related to consumer confusion, rather the rights of manufacturers to use terms. Whatever the outcome, it is certain that the market for non-meat derived products is going to continue to expand as consumers seek alternatives to animal products.

OTHER COUNTRIES

In some countries, such as Canada, the naming of these alternative items is clear as the Food and Drug Regulation B.01.100(1) clearly indicates that the words "imitation", "substitute" or "simulated" must be as the part of the common name when a product deviates from the common name. For example, a

soy based item being sold to appear as a chicken breast properly labelled would become soy simulated chicken breast, or similar.¹⁰

In other countries, such as Australia, this battle between animal protein and alternative proteins is still ongoing but may soon be completed as politicians are now involved and can point to what has already transpired in the USA, EU and other countries.¹¹ These groups can also point to the truth in labeling requirements and that Food Safety Australia New Zealand states that these products, if designed for those aged five and under, must clearly be labeled as unsuitable as a complete milk replacement.¹²

ANIMAL CELL CULTURE PRODUCTS

Adding complexity to the debate is the unique position of animal cell culture products. From a protein allergen perspective, these products have the same allergen potential as traditionally harvested meat products. In terms of the effects these products can have on consumers, therefore, they have an equal potential for causing serious risk or possibly death.

The real questions are:

- Can the consumer can easily distinguish the differences between the animal protein and the vegetarian alternatives?
- Can labeling of animal cell cultured products be developed such that it identifies these products while still allowing consumers to safely consume these items without risking allergenic reaction because of confusing labelling?

It is very apparent that the industries will not come to a quick agreement without government intervention, so the governments will take action, but to what extent is unclear as this action may have unintended consequences, such as a ban on products being labeled as vegetable schnitzel.¹³

SGS SOLUTIONS

With a global network of experts, dedicated laboratories and a regulatory data base (SGS Digicomply), SGS offers a comprehensive range of services to help manufacturers and suppliers of animal cell culture and vegetarian alternative products are safe and compliant with national and international regulations.

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

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⁹<http://www.assemblee-nationale.fr/dyn/15/amendements/0627/CION-ECO/CE2044>

¹⁰<http://www.inspection.gc.ca/food/requirements/labelling/industry/common-name/eng/1354906212164/1354906290936?chap=3#s5c3>

¹¹<https://www.foodnavigator-asia.com/Article/2018/11/14/No-more-almond-milk-Australia-looks-to-stop-misleading-plant-based-product-labelling#>

¹²<http://www.foodstandards.govt.nz/consumer/labelling/truth/Pages/default.aspx>

¹³<https://www.telegraph.co.uk/news/2016/12/28/time-ban-veggie-schnitzel-says-german-minister-brands-labels/>

FSMA

FSMA VQIP OR FSMA FSVP?

Which FSMA certification scheme to choose?

As FSMA certification grows in popularity, one of the first steps for facilities applying for FSMA certification is to choose between the two FSMA schemes.

In general, choosing the right certification for any scheme can be a difficult decision. But the selection process may become even more interesting with new schemes, especially if they address certification from a regulatory perspective rather than conformance with standards. Therefore, providing the right advice is key to helping clients make their selection between the FSMA VQIP or FSMA FSVP schemes.

FSMA VQIP CERTIFICATION

The creation of FSMA VQIP certification scheme was triggered by the FSMA Accredited Third Party Certification (TPP) rule that for the first time ever, provided a roadmap for certification bodies like SGS to get accredited and start offering regulatory food safety certification to foreign facilities supplying food for consumption in the US.

The FSMA TPP rule though provides two specific mandates for VQIP certification:

- 1.) As a prerequisite for importers participating in the Voluntary Qualified Importer Program (expedited entry program)

- 2.) As a compliance tool in the FDA toolkit, whereby FDA may request facility certification as a prerequisite for admissibility of certain foods that may be considered high-risk

Because VQIP certification falls under FSMA TPP rule and is under the FDA's direct supervision, there are specific requirements that certification must adhere to. For instance, audits must be unannounced, the same auditor cannot conduct regulatory audits at the same facility for a period of 13 months, regulatory audit reports must be shared with FDA, etc.

Therefore, FSMA VQIP certification is a regulatory tool recognized by FDA, but may be a bit of a stretch for foreign facilities that are just looking for proof of compliance outside the regulatory framework of the accredited third party certification rule. That's where FSMA FSVP certification may be a more appealing option for such foreign suppliers.

FSMA FSVP CERTIFICATION

FSMA FSVP certification carries the same weight as FSMA VQIP as a compliance scheme. However, FSMA FSVP is developed as a third-party voluntary scheme, for foreign suppliers who are simply looking for a compliance certificate.

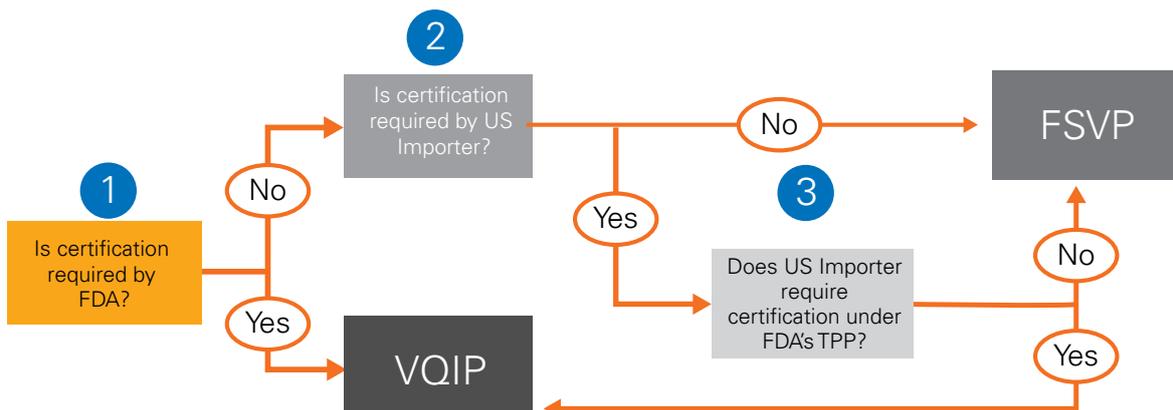
FSVP certification is like any other voluntary certification scheme. It is done in two stages, audits are announced, and the requirements of TPP rule do not apply to it.



To help our clients decide which certification scheme to choose, we developed the following decision tree:

- 1.) If certification is required by the FDA, then supplier will have to follow the TPP path, which is FSMA VQIP certification
- 2.) If certification is required by the importer, then the next question to ask is if the importer needs it for the expedited entry program under (VQIP) or not
- 3.) If certification is requested for the expedited entry program, then VQIP certification would be the right scheme to choose, as it falls under the TPP rule

FSMA CERTIFICATION DECISION TREE



In the absence of requests from the FDA or importer, suppliers can still voluntarily choose to be certified either for VQIP or FSVP scheme. In that case, it will be up to the foreign supplier to decide whether to apply for FSMA VQIP certification under FDA or the FSMA FSVP certification for supplier verification.

INTEGRATED CERTIFICATION WITH GFSI SCHEMES

Clients across the world have been inquiring about the possibility of combining FSMA certification with their GFSI audit. While GFSI schemes have come up with addendum modules for the PC Human Food rule, they make it clear however, that such modules are

not for FSMA compliance purposes. Therefore, FSMA certification remains the only proof of FSMA compliance. To facilitate the process for GFSI certified clients, SGS has developed an integrated certification program for FDA FSMA compliance combined with GFSI. For foreign suppliers who are currently certified for a GFSI scheme, or planning on a joint certification, SGS offers integrated certification. The integrated certification approach provides many proven advantages for companies.

- It creates audit efficiencies: with 1 audit covering 2 standards, leading to 2 certificates (FSMA and GFSI)
- It addresses all the requirements of each scheme individually, with emphasis on the differences between FSMA certification requirements and GFSI schemes

- It is a great option for foreign suppliers wanting to maintain both a FSMA certification and a GFSI certification
- SGS is currently offering integrated certification for FSMA VQIP/FSVP and BRCGS. This integrated certification is unique in the market, as it leads to compliance certification for FDA's FSMA through VQIP & FSVP certification for clients who choose to maintain GFSI certification at the same time.

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

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WHITE PAPER

WHITE PAPER: EXAMINING CORPORATE SOCIAL RESPONSIBILITY IN THE SEAFOOD SECTOR

From the farm to the processor, Corporate Social Responsibility (CSR) is racing up the seafood industry agenda.

Within the seafood sector, leading retailers and food service operators, as well as their supply chain partners have introduced and developed corporate sustainability and sourcing policies. To protect the environment and fish stocks, and in response to stakeholder and consumer demand, these policies have evolved.

Today, CSR policies across the industry demand real change in the procurement and production strategies for both wild-caught and aquaculture producers and traders. Although producers and their respective government's seafood ministries remain pro-export, change has occurred not just on the regulatory level, but also in the way that collaboration has accelerated supply chain transparency, and the capability and capacity to enforce local and international laws.

DATA ANALYSIS

For the first time, our research team has compiled and analyzed global data from CSR audits (Best Aquaculture Practices (BAP), Business Social Compliance Initiative (BCSI) and Sedex Members Ethical Trade Audit (SMETA)), together with current research and industry best practices. The audit data covers the supply chain from farm (land and offshore) to processor. We explore multiple assessment criteria and point to opportunities for improvement.

The assessments have highlighted issues of worker protection, discrimination and inadequate reporting for child/young workers. There is also evidence supporting more attention to significant health and safety issues.

INDUSTRY CHALLENGES

The analysis acknowledges the challenges of the operating environments, all of which require better financial/market conditions to support investments in:

- Management and employee training
- Wages and working conditions
- Infrastructure improvements
- A means to support traceability
- The end of recruitment and wage conditions that support forced/bonded labor and potentiaegal, Unregulated, Unreported (IUU) fishing

COMMON THEMES

The issues identified, and the way forward are not unique to the seafood industry. Both food and non-food, global supply chains face similar challenges when expanding the scope of sustainability from a focus on the finished product back to the environment and the working conditions from which the raw materials are transformed. Many leading brands, and environmental NGOs have set forth excellent working models toward supply chain mapping, risk assessment, corporate traceability, vendor engagement, audit and certification, communication, supplier engagement and investment, and stakeholder reporting.

While any CSR assessment is a snapshot in time, we expect that future analyses will advance the sustainability of the seafood industry



Download your copy of: [Examining Corporate Social Responsibility in the Seafood Sector](#)

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

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SGS WEBINARS	LANGUAGE	WEBINAR STATUS & LINK
Accredited FSMA Certification: Ensuring Compliance & Commercial Advantage	EN	On-demand
Kosher Certification: Trends, Challenges and Opportunities	EN	On-demand
Global Regulatory Requirements: Reduce Time To Market With Data Insights	EN	On-demand
Food Recalls: Using AI To Scan and Monitor Food Safety Data	EN	On-demand
FSMA: Process Method Validation and Environmental Monitoring	EN	On-demand
BRC Standard for Food Safety – Key Changes & Pitfalls to Avoid for Issue 8	EN	On-demand
Understanding FSMA Labeling & Allergen Requirements	EN	On-demand
ISO 22000:2018 – A Brief Overview	EN	On-demand
FSMA Requirements for Animal Feed and Pet Food Companies	EN	On-demand
Improve Food Authenticity, Traceability And Safety Using NGS	EN	On-demand
Authenticity testing of vanilla flavors: Alignment between source material, claims and regulation	EN	On-demand
Contaminant Limits: Translating Market Policies and News into Concrete Process Improvements within your Regulatory Environment	EN	On-demand
Understanding California Prop 65 and Labeling Requirements for Food	EN	On-demand
Food Safety Due Diligence: Identify Risks Before Selling or Investing	EN	On-demand
Chinese Compliance Requirements for Health Food Imports	EN	On-demand

SAFEGUARDS

- [Australia Establishes Mrls For Six Pesticides In Food-Producing Animals ▶](#)
- [US Approval Of Hemp Ingredients In Food And Dietary Ingredients ▶](#)
- [USDA AMS US National Bioengineered Food Disclosure Standard Finalized ▶](#)



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WHEN YOU NEED TO BE SURE

