

The Contaminant Has a Supply Chain

Europe's 2026 MOAH Transition, the Cocoa-Jute Evidence and the Case for Forensic Ingredient Traceability

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META DESCRIPTION: Europe's pending MOAH limits expose a supply-chain problem: cocoa transport, oil contamination and chemical fingerprints demand robust ingredient traceability.

INTERNAL TAGS: MOAH; MOSH; Cocoa; Contaminant Control; Chemical Traceability; Food Regulation; Analytical Chemistry; Supply Chains

Abstract

Europe is approaching a decisive transition in its control of **mineral oil aromatic hydrocarbons (MOAH)** in food. Following a favourable Member State vote on 13 May 2026, the European Commission targets adoption of commodity-specific maximum levels in October, with staggered application from 2027 and, for some categories, 2028 or 2030. Meanwhile, a 2025 cocoa supply-chain study demonstrates how **contaminated jute bags can transfer mineral oil hydrocarbons into beans and downstream cocoa fractions**. These developments reveal a larger problem when a finished-product MOAH result cannot identify its source, and a low result cannot establish that upstream controls are reliable. This article integrates toxicology, chromatographic uncertainty, processing mass balance and comparative food law to argue for source-resolved chemical traceability. It proposes a research framework combining longitudinal sampling, hydrocarbon fingerprints, ingredient genealogy and uncertainty-aware source attribution. The goal is not to replace statutory maximum levels, but to make prevention, supplier qualification and compliance scientifically reconstructable.

Central proposition *A maximum level can classify a result while only a reconstructable supply chain can explain -and prevent- the contamination that produced it.*

1. Why October 2026 Matters

The decisive regulatory event has already occurred, although the final legal act should not be treated as published before it appears in the Official Journal. On 13 May 2026, Member States gave a favourable vote to a Commission draft amending Regulation (EU) 2023/915 to establish maximum levels for mineral oil aromatic hydrocarbons (MOAH) in specified foods. A companion draft would revise sampling and analytical provisions under Regulation (EC) No 333/2007, and a monitoring recommendation was endorsed. As of the 13 October 2026 research cut-off, the Commission's official catalogue still describes adoption as targeted for October 2026, rather than identifying an adopted act. [1,2]

The transition has already influenced enforcement. In its 13 May joint statement, the Standing Committee agreed that the future maximum levels should serve as the basis for enforcement under Article 14 of Regulation (EC) No 178/2002 during the interval before their formal application, where the proposed levels are higher than earlier quantification-based action values. Most new limits are intended to apply from 1 January 2027, while some are deferred until 2028 or 2030. The exact legal position for a product therefore depends on the applicable food category, the date, the competent authority's interpretation and the published final text. [2,3]

The technical significance is not merely that another contaminant receives numerical limits. The proposed architecture reaches into fats and oils, cocoa, cereals, nuts, spices, dairy, supplements and compound foods. These are precisely the products in which upstream transport, contact materials, processing aids and industrial equipment can leave chemically similar residues. A finished-product specification will be necessary, but it will not be a sufficient explanation of control.

2. The Toxicological Problem Is a Mixture, Not a Single Molecule

Mineral oil hydrocarbons (MOH) are complex mixtures of compounds derived principally from petroleum, although related hydrocarbon mixtures may also originate from other feedstocks. Analytical practice groups them into **mineral oil saturated hydrocarbons (MOSH)** and **mineral oil aromatic hydrocarbons (MOAH)**. These labels describe broad chemical fractions rather than single, toxicologically homogeneous substances. [1,4]

EFSA's 2023 reassessment drew a critical distinction. Current estimated dietary exposure to MOSH was not considered a health concern, although accumulation and limited margins of safety justify maintaining mitigation. For MOAH, concern is associated particularly with compounds containing three or more aromatic rings, some of which may be genotoxic and carcinogenic. The evidence base for one- and two-ring MOAH remains insufficient for a definitive risk characterisation. These conclusions do not mean every detected aromatic hydrocarbon has

identical potency, nor that an unresolved MOAH chromatographic signal can be interpreted as a measured concentration of known carcinogens. [4,5]

This is a central regulatory-science tension as far as risk management may need a practical group-based limit even while analytical science cannot routinely specify the toxicological contribution of every constituent. The limit is a protective operational tool, not proof that all members of the group are biologically equivalent.

3. A Cocoa Bag Can Be a Chemical Input

A particularly relevant peer-reviewed study by Moret and colleagues investigated cocoa beans before and after transport in jute bags. Across 28 cocoa-bean samples, average MOSH increased from approximately 0.9 to 9.6 mg/kg following transport; MOAH reached 2.3 mg/kg. The authors reported that, on average, around 40% of hydrocarbons transferred to whole beans reached shelled beans, and that contamination subsequently moved into cocoa mass and partitioned between cocoa butter and powder in relation to their fat contents. [6]

The study matters because it documents an exposure pathway before the ingredient reaches the processor. Jute is often considered a natural and therefore intuitively benign transport material. That intuition is inadequate: the relevant questions concern previous treatments, mineral-oil residues, storage conditions, contact time, hydrocarbon mobility and the eventual food matrix. A natural-fibre package is not automatically chemically inert.

The quantitative findings must not be generalised to every jute bag or cocoa origin. The study characterises specific samples and conditions. However, it does not prove that jute is the dominant MOAH source in all cocoa supply chains. It does, to defeat the assumption that cocoa-butter or cocoa-powder contamination necessarily begins in the factory where those ingredients are manufactured.

4. The Contamination Route Is a Network

Food businesses often investigate mineral oil contamination by looking first at packaging. That is understandable since recycled paperboard, printing inks and contact materials have long been prominent sources. But the Commission's own inventory includes machinery lubricants, processing aids, food and feed additives, transport and environmental contamination. [1]

A cocoa supply chain can involve harvesting tools, drying surfaces, sacks, warehouses, shipping containers, mechanical conveyors, roasting, winnowing, grinding, pressing, powder handling, storage silos and final packaging. Each stage can introduce, remove, redistribute or concentrate hydrocarbon fractions. In edible oils, harvesting machinery, hydraulic fluids, pomace storage, extraction and refining present a different constellation of possible entry points. A 2026 review of olive oils describes the importance of harvest-related contamination and the special concentration challenges of pomace oils. [7]

The correct object of investigation is therefore not the finished bag or drum alone, but the full network of contacts and transformations. Two batches with the same total MOAH concentration may have entirely different contamination histories, while a single upstream event may produce different final concentrations in high-fat and low-fat fractions.

5. Concentration Is Not Source Attribution

Suppose a cocoa powder is found to contain 0.9 mg/kg MOAH. The number may be relevant to an applicable limit, but it cannot establish whether the contamination came from sacks, a lubricant, the original bean environment or a downstream contact surface. Nor does a lower result from another batch prove that the second supply chain has superior preventive controls; it may simply have experienced different contact times, dilution or partitioning.

The distinction is between compliance measurement and causal explanation. A result expressed as mg/kg describes a measured concentration in a defined sample and method. A source-attribution claim requires

independent information containing at least hydrocarbon distribution, carbon-number range, sample chronology, upstream controls, process changes, alternative-source testing and, ideally, a reproducible match between candidate sources and affected product. [6,8]

For ingredient manufacturers, this means that a certificate of analysis should be considered an observation rather than an account of how the result was achieved. Supplier approval based only on end-product results is vulnerable to a change in bags, transport routes, maintenance fluids or process conditions that may not be reflected until a later shipment.

6. A Process Mass Balance Is Necessary but Not Sufficient

A first approximation to the contamination of a composite food is a material balance. Having this in account, we know that the total MOAH mass contributed by incoming ingredients and other sources, minus removal or losses, divided by the mass of final product. In symbols, $C_{final} \approx [\sum(m_i \times C_i) + M_{process} + M_{contact} - M_{removed}] / m_{final}$. This is an engineering accounting relationship, not a validated predictive model for every hydrocarbon fraction.

The approximation becomes unreliable when one assumes uniform distribution. MOAH can partition into fat-rich phases, adhere to surfaces, undergo selective volatilisation, accumulate in residues or move differently across carbon-number ranges. Roasting, pressing, deodorisation and fractionation can change the analytical profile without necessarily establishing toxicological elimination. The cocoa study's observed partitioning into cocoa butter and powder is a concrete reason to test fraction-specific behaviour rather than apply one generic processing factor. [6]

A robust process-fate study therefore needs paired input/output samples, dry-matter and fat-basis calculations, mass-yield records, blanks, recovery experiments and uncertainty propagation. Where possible, it should report carbon-range or structural-class changes in addition to total MOAH. An unexplained reduction in a measured fraction is not automatically proof of contaminant destruction.

7. Why the Chromatogram Is Not a Toxicological Verdict

Routine MOH analysis generally relies on on-line liquid chromatography–gas chromatography with flame ionisation detection (LC–GC–FID). It can quantify broad saturated and aromatic fractions, but the unresolved complex mixture often appears as a broad chromatographic envelope rather than a set of individually identified molecules. The technique is powerful for screening and quantification within its validated scope, yet its output should not be confused with a complete molecular inventory. [8,9]

Comprehensive two-dimensional gas chromatography (GC×GC), often coupled to mass spectrometry, provides greater resolving power and may assist with identification of interfering substances and characterisation of hydrocarbon patterns. The European Reference Laboratory for Processing Contaminants issued guidance in 2025 on analysis, interpretation and reporting by GC×GC. It is a valuable complement to the Joint Research Centre's 2023 guidance, not a guarantee that every complex food matrix will produce an unambiguous source fingerprint. [9,10]

The analytical lesson is especially important for naturally complex ingredients. A reported 'total MOAH' result can be affected by co-elution, sample preparation and matrix-specific interference. Source investigation must begin with analytical validity, not with a presumption that the laboratory signal has only one chemical explanation.

8. Interferences Are a Legal as Well as an Analytical Problem

In fats, cocoa-derived ingredients, herbs and other complex matrices, naturally occurring compounds and processing-related hydrocarbons can interfere with group analysis. Clean-up strategies such as saponification and epoxidation may reduce particular interferences, but their performance is matrix- and analyte-dependent. A

2026 review of sample preparation illustrates why no single procedure should be treated as universally interchangeable across foods. [11]

An interlaboratory study published in 2025 compared mineral-oil confirmation across several expert laboratories using coconut oil, palm olein and olive oil. The authors documented discrepancies and called for greater harmonisation in two-dimensional GC–MS interpretation. This matters for enforcement because a marginal result near a future maximum level may lead to different decisions if the analytical approach, integration rules or confirmation criteria differ. [12] The correct response is not to dismiss inconvenient positive results but to define in advance how samples are collected, how blanks are controlled, when confirmatory analysis is required, how measurement uncertainty is handled and how laboratories resolve discordant findings. For high-value ingredients, the cost of such discipline is small compared with the commercial and reputational cost of an avoidable recall or disputed rejection.

9. The Sample Container Can Become the Contamination Source

MOH investigations are unusually susceptible to contamination during sampling. An operator who transfers a low-level sample into an unsuitable container, uses an inappropriate closure or exposes it to lubricated equipment can compromise the result before it reaches the laboratory. Conversely, failure to capture representative heterogeneity can produce a falsely reassuring result.

The JRC's 2023 guidance addresses sampling, analysis and reporting. The draft 2026 changes to Regulation (EC) No 333/2007 are intended to strengthen official analytical requirements for MOH. Companies should align their sampling protocols with validated laboratory instructions and verify the compatibility of containers, closures, labels, transport materials and blanks. [1,9]

A forensic investigation should preserve chain of custody, sample location, lot, date, handling history and the physical state of the material. It should include control samples of suspected contact materials where technically appropriate. An analytical number without trustworthy sampling metadata is weak evidence for source attribution.

10. The EU Legal Architecture: Three Different Layers

The **first layer** is the general safety obligation. Regulation (EC) No 178/2002, particularly Article 14, prohibits placing unsafe food on the market. Council Regulation (EEC) No 315/93 requires contaminants to be kept as low as reasonably achievable through good practices. These obligations do not disappear simply because a specific numerical maximum level has not yet taken effect. [3,13]

The **second layer** is the commodity-specific limit. Regulation (EU) 2023/915 currently provides the EU framework for maximum levels of listed contaminants. The MOAH amendment received a favourable vote on 13 May 2026, but at the present research cut-off the Commission still presents it as awaiting adoption. Businesses should not cite the draft as a published, binding amendment. They should nevertheless prepare for its anticipated category-specific application dates. [1,14]

The **third layer** is official-control methodology and monitoring. Regulation (EC) No 333/2007 supplies sampling and analytical rules for specified contaminants; the MOH amendment is being prepared in parallel. Recommendation (EU) 2017/84 established an earlier monitoring framework, and a new recommendation has been endorsed. Together, these layers determine not only what must be controlled, but how evidence is produced and interpreted. [1,9,15]

11. Interim Enforcement Is Not a Legal Vacuum

The 13 May 2026 Standing Committee statement addresses the gap between the favourable vote and the application of the future maximum levels. Its stated purpose is to prevent a paradox in which the older 2022 quantification-based action values are lower than some of the newly agreed category limits. Member States

agreed to use the new levels as a basis for enforcement under Article 14 of the General Food Law from 13 May 2026, subject to the detailed statement. [2]

This is not equivalent to saying the draft maximum levels are already directly applicable law. The legal basis and decision-making framework during the interim period remain distinct from those after formal entry into application. Nor does the statement extinguish the general duty to avoid unsafe food or justify deliberately increasing contamination up to a numerical threshold.

For operators, the practical consequence is to maintain a dated regulatory register identifying the source and status of each threshold: published law, Standing Committee statement, draft annex, national enforcement guidance or contractual specification. These are not interchangeable categories of authority.

12. Product Categories and Transitional Dates Are Technically Material

The proposed framework does not assign one universal MOAH limit to all foods. Draft categories include fats and oils, oilseeds, nuts, cereal products, cocoa beans and derivatives, dairy, spices, herbs, supplements, infant foods and certain processed or compound products. Many categories are differentiated by fat content, reflecting analytical and exposure-management considerations. The draft and accompanying explanatory materials also envisage later application for selected categories, including dates in 2028 and 2030. [1,16]

For cocoa businesses, the distinction between beans, cocoa mass, cocoa powder, cocoa butter and confectionery is particularly important. The draft annex, as summarised by the Cocoa Association of Asia, envisages different levels and transitional schedules across those categories; it also distinguishes certain compound foods. Those draft values are planning inputs until the final legal text is published and verified. [16]

A company should therefore classify each SKU by its legal food category, fat content, intended use and destination market. A supplier's single 'MOAH compliant' statement is incomplete unless it identifies the applicable category, limit, analytical method and date.

13. Cocoa Powder, Cocoa Butter and the False Comfort of a Common Origin

Cocoa powder and cocoa butter can originate from the same beans, yet they are not chemically interchangeable exposure matrices. Hydrocarbon mixtures are lipophilic, and processing can redistribute them between the fat-rich butter fraction and the lower-fat cake/powder fraction. The Moret study documented transfer along the chain and fractionation in relation to fat content. [6]

This creates a quality-assurance challenge for cocoa ingredients. A single incoming-bean result does not automatically establish the final concentrations of every derivative. A cocoa-powder specification cannot simply be copied to cocoa butter, and the reverse is equally unsound. When the final product is a blended cocoa substitute or a multi-ingredient formulation, the ingredient genealogy and fat fraction become still more important.

For INTABIOTECH's cocoa-related domain, the commercially useful approach is to qualify each material by its own matrix, source history and intended destination. That is a scientific and procurement recommendation, not a claim that any particular INTABIOTECH product currently contains MOAH or requires corrective action.

14. Spices, Herbs and Low-Dose Ingredients Present a Different Problem

Spices and dried herbs often enter finished foods at low inclusion rates, but their production and distribution can involve long transport routes, complex drying surfaces, sacks and multiple intermediaries. Their chemical matrices are also analytically difficult. Draft EU provisions acknowledge that some matrices need different analytical limits of quantification and tailored category treatment. [1,17]

A low inclusion rate can reduce the mass contribution to a composite product, but it does not excuse a non-compliant raw material where a direct limit applies to that raw material. Nor can dilution be assumed to legalise a

contaminated ingredient: the rules governing mixing, processing factors and placing contaminated foods on the market must be evaluated independently. [14]

A better strategy is to distinguish two questions. The first is whether the incoming ingredient meets its own applicable standard. The second is whether its measured concentration, inclusion rate and processing fate are relevant to the final product's compliance and exposure. Those are related but legally distinct decisions.

15. Spain, Great Britain, Northern Ireland and the United States

Spain applies the EU contaminant framework directly. The relevant official-control system operates through competent Spanish authorities under EU legislation. A Spanish ingredient supplier selling into another Member State must therefore prepare for the harmonised MOAH framework as finally adopted, without treating future draft limits as already in force.

Great Britain has a distinct post-Brexit food-law framework and does not automatically acquire new EU maximum levels merely because the EU adopts them. However, the absence of identical numerical rules does not imply acceptance of unsafe MOAH contamination. In January 2026 the UK Food Standards Agency updated an alert directing withdrawal and recall of specified imported confectionery containing MOAH. This is a concrete reminder that general food-safety enforcement can operate independently of the forthcoming EU schedule. [18]

Northern Ireland remains subject to relevant EU food-law provisions under the Windsor Framework, subject to applicable arrangements and exceptions. The United States instead regulates specific mineral-oil uses through its own food-additive and food-contact provisions. FDA's inventory lists white mineral oil in connection with several uses and 21 CFR provisions, but an authorised use of a properly specified white mineral oil is not a blanket authorisation for arbitrary aromatic contamination from machinery, transport or packaging. [19,20]

The correct export strategy is market-specific. Neither EU draft compliance nor a U.S. food-grade designation should be treated as a universal passport across jurisdictions.

16. Feed Is Not Simply Food with a Different Label

MOH can also enter feed systems, and a 2026 observational study examined MOSH and MOAH in feed and milk at three dairy farms. That work is useful as an emerging signal but is not sufficient to establish population-wide transfer coefficients or a causal exposure model. [21]

The EU's proposed MOAH maximum levels discussed here concern foods within the scope of Regulation (EU) 2023/915. They should not be represented as automatically imposing identical limits on feed ingredients. Feed is governed by its own safety and undesirable-substance legislation, including Directive 2002/32/EC and general feed-safety duties. Any feed-specific specification or action must be assessed under that framework and the destination market's requirements. This distinction is commercially material for companies supplying both food and animal nutrition. A dual-use material requires separate regulatory classification, sampling plans, analytical expectations and documentary evidence. 'Food grade' does not itself prove feed compliance, just as feed registration does not establish food compliance.

17. What an Effective Supplier Dossier Should Actually Contain

A mature MOAH supplier dossier should identify the ingredient and its processing route; the countries and sites involved; primary and secondary packaging; transport and storage contact materials; potential lubricant and release-agent contacts; available MOH analytical results; laboratory method and LOQ; and a documented response plan for confirmed positives.

For cocoa and other commodities transported in sacks, qualification should extend to bag sourcing, any relevant treatments or contamination history, storage conditions and evidence of contact-material suitability. For oils, it

should cover harvest equipment, hydraulic systems, storage and refining where relevant. For spices, it should address drying, handling, packaging and analytical interferences. These are examples of risk-based questions, not a universal mandatory checklist. The dossier should also preserve batch genealogy. If a customer later detects MOAH, the supplier must be able to identify which incoming lots, bags, equipment lines and processing events contributed to the affected shipment. A certificate without reconstructability is not a robust contamination-control system.

18. Why a Single Negative Result Can Mislead

A non-detect or below-LOQ result means the method did not quantify the target fraction above its validated threshold in the sample analysed. It does not establish absolute absence, future stability or representativeness of an entire heterogeneous consignment.

The evidentiary strength of a negative result depends on the sample plan, lot size, number of increments, homogenisation, laboratory performance, matrix effects and the distribution of contamination. Where contamination occurs through discrete contact events -for example a small number of treated sacks or an intermittent lubricant leak- composite sampling may dilute a localised signal.

The industrial objective is therefore not maximal testing without a hypothesis. It is an adaptive plan that may contain baseline sampling for qualification, intensified sampling after supplier or packaging changes, targeted testing after suspected contamination events, and periodic verification that the controls remain effective. Such an approach is more informative than simply increasing the number of certificates.

19. Research & Innovation Opportunity - The Source-to-Product Hydrocarbon Evidence Graph

Unresolved problem. Current industrial systems rarely link hydrocarbon analytical profiles, process transformations, transport contacts and supplier records in a way that permits defensible retrospective source attribution. Total MOAH values can trigger action but seldom identify the origin of contamination.

Why it matters. If the origin is not found, businesses may reject lots without correcting the source. Conversely, they may introduce ineffective packaging changes while overlooking harvest or process contamination. The cocoa-jute study provides a concrete mechanism and a reason to investigate earlier stages. [6]

What is known. LC–GC–FID provides routine group quantification. GC×GC–MS can reveal more detailed distributions, hydrocarbon mixtures may change with contact, processing and fractionation, and supply-chain lot genealogy is technically feasible. What remains unknown is whether a sufficiently stable, source-discriminating fingerprint can be obtained across diverse commodities and processing stages under routine industrial conditions. [8–12]

Hypothesis (proposed, not established). Combining carbon-number distribution, aromatic-class patterns, selected diagnostic signals, sampling chronology and process genealogy in an uncertainty-aware graph could improve source attribution compared with total MOAH concentration alone.

Validation pathway. Recruit multiple cocoa and oil supply chains, sample candidate sources (bags, lubricants, contact surfaces, ingredients) and products before and after processing, quantify MOSH/MOAH with validated methods, characterise selected samples using GC×GC–MS, establish recovery and blank controls, pre-register source-attribution criteria, test blind mixtures and independent facilities, evaluate false attribution, detection sensitivity, costs and portability.

Regulatory constraints. The framework would supplement -not replace- official sampling, maximum levels or the competent authority's determination. Fingerprint similarity must never be presented as proof of legal

responsibility without independent evidence. Proprietary supplier data, chain-of-custody records and laboratory methods require appropriate governance.

Potential industrial value. A validated method could target corrective action, distinguish packaging from machinery contamination, improve supplier qualification and reduce unnecessary rejection. At present it is a research agenda, not an authorised compliance method.

20. A Second Innovation Question: Can Source Prevention Be Optimised?

Once the dominant sources are identified, a second development pathway becomes possible, so it's important to compare interventions under realistic production conditions. Candidates may include different transport bags or liners, validated barrier materials, improved hydraulic-fluid management, preventive maintenance, segregation of lubricated equipment, changes in storage time and targeted process modifications.

The scientifically meaningful endpoint is not only a lower final MOAH value in one trial. It is a reproducible reduction in contamination probability and concentration across seasons, suppliers and matrices, without creating new chemical migration, microbiological, sustainability or functional problems. A barrier may reduce one transfer route while adding cost or compromising moisture control; a process change may lower light hydrocarbon fractions while affecting yield or product quality.

A prospective design should therefore compare paired lots and track food-safety outcomes, analytical uncertainty, quality, cost, energy, waste and regulatory compatibility. No one intervention should be promoted as universally effective before such validation.

21. Analytical Governance Is a Commercial Capability

The 2025 EURL-PC guidance and 2023 JRC document should be used to build a common language among purchasing, quality, external laboratories and customers. Specifications should state the matrix, analyte fraction, carbon range where relevant, analytical method, LOQ, reporting conventions, treatment of interferences, measurement uncertainty and decision rule. [9,10]

Disputes often arise because one party reports a broad total fraction while another interprets a confirmed, interference-corrected result. A laboratory result that is technically valid for screening may require additional confirmation before a major commercial decision. The reverse is also true: an operator cannot invoke possible interference to ignore a result without arranging competent verification.

The most valuable operational investment may be a standardised decision tree: ***presumptive result → technical review → confirmatory method when indicated → source investigation → product disposition → preventive action → effectiveness verification***. This reduces both overreaction and complacency.

22. The Business Case Is Larger Than Compliance

MOAH control affects procurement, logistics, formulation, technical sales, customer contracts and insurance. A supplier that can demonstrate reliable control and rapid source investigation may be more attractive than one offering a slightly lower price but only a generic certificate. The economics are especially relevant to ingredients distributed into many downstream products, where one problematic lot can affect numerous manufacturers.

A source-resolved system can also avoid indiscriminate substitution. Replacing every jute bag, lubricant or packaging material without knowing the principal source may be expensive and environmentally counterproductive. A better programme prioritises interventions according to evidence, feasibility and the reduction in expected risk.

For market-facing communications, the defensible claim is process competence in a defined way competing defined preventive controls, traceability, appropriate analytical verification and corrective-action capability.

Absolute claims such as 'MOAH-free' require a precise definition and should not be made on the basis of a single non-detect.

23. A Ninety-Day Industrial Readiness Programme

Days 1-30: build a product-by-product register covering EU categories, expected application dates, destination markets, existing specifications and analytical methods. Identify high-risk ingredients and likely contact sources. Confirm with suppliers and laboratories what is actually being measured, and retain the distinction between the 2026 draft, interim statements and enacted law.

Days 31-60: perform targeted baseline testing for selected materials, document sample collection and blank controls, review sack, packaging, lubricant and process-contact risks, establish a procedure for handling results near decision thresholds. Begin lot-level mapping for cocoa, oils, spices and other relevant ingredients.

Days 61-90: close evidence gaps through supplier requests and, where justified, confirmatory analysis, prioritise preventive actions, run one retrospective traceability exercise, define the escalation protocol for a confirmed positive and prepare customer-facing technical dossiers that accurately describe the current regulatory status. Update the programme immediately when the final EU acts are published.

The objective is not to claim compliance with an unpublished amendment. It is to ensure that, once the applicable text is confirmed, the business can implement it without reconstructing its entire supply chain under pressure.

24. Evidence Status: What This Article Does and Does Not Establish

Established evidence: EFSA distinguishes the toxicological profiles of MOSH and MOAH since the Commission recorded a favourable May 2026 vote and an October adoption target. The 13 May statement addresses interim enforcement and the 2025 cocoa study documents transfer from contaminated jute bags under the conditions investigated; and published guidance recognises significant analytical complexity. [1–12]

Emerging evidence: recent studies on olive oils, cocoa, sample preparation and interlaboratory confirmation refine understanding of matrix-specific contamination pathways and analytical uncertainty. Their results should not be extrapolated without considering study design and scope. [6,7,11,12]

Expert interpretation: ingredient-supply chains should treat MOAH as a dynamic contamination-network problem rather than solely as a finished-product number. This follows logically from the documented multiplicity of sources and processing redistribution, but its comparative industrial effectiveness requires prospective testing.

Hypothesis and research agenda: the proposed hydrocarbon evidence graph and prevention-optimisation programme may improve source attribution and control. They are not established regulatory tools, do not demonstrate any proprietary technology's efficacy and do not identify responsibility in a specific contamination incident.

25. Conclusions: From Limits to Reconstructable Prevention

Europe's forthcoming MOAH framework will give the food industry more explicit category-based thresholds. But the most important lesson of the transition is upstream. Mineral oil hydrocarbons can enter food through transport materials, harvesting and processing equipment, contact surfaces, packaging and other pathways and their measured distribution can change with fractionation and matrix composition.

The cocoa-jute evidence demonstrates why the chemical history of an ingredient may begin long before the final factory receives it. Analytical guidance demonstrates why a number near a limit must be interpreted with method, matrix and uncertainty in mind. Comparative law demonstrates why a future EU threshold cannot simply be copied into a Great Britain or U.S. compliance declaration.

A serious control strategy therefore combines four elements: the correct legal threshold, analytically defensible measurement, source-specific preventive controls and reconstructable supply-chain evidence. The first three are familiar, while the fourth is often missing.

The central proposition is simple, so it will state when a contaminant may be measured in the finished food, but it has travelled through a supply chain. The next generation of chemical food safety should be capable of following that journey.

Comparative Regulatory Matrix (Status: 13 October 2026)

Jurisdiction	Current position	Immediate industry implication
EU / Spain	General food-safety duties apply; MOAH amendment received favourable May 2026 vote; publication still pending in Commission catalogue.	Track final Official Journal text, commodity-specific limits, interim enforcement statement and phased dates.
Great Britain	Separate domestic legal framework; UK FSA enforced MOAH-related withdrawals/recalls in January 2026.	Do not assume future EU limits automatically become GB law; maintain market-specific safety assessment.
Northern Ireland	Relevant EU food law continues under the Windsor Framework, subject to applicable arrangements.	Confirm EU rules and the specific movement/placing-on-market route.
United States	Specific white mineral-oil uses appear in FDA regulatory inventories; no equivalence with arbitrary MOAH contamination.	Assess exact substance, specification, intended use, contaminant profile and applicable U.S. provisions.

Interpretive note: This matrix summarises legal status; it is not a substitute for verifying the final applicable instrument and product category.

Related Knowledge Areas

Food Safety (chemical hazards and preventive controls); Regulatory Affairs (EU/GB/US market access); Processing Technologies (transfer and partitioning); Functional Ingredients (supplier and lot qualification); Sustainability (targeted rather than indiscriminate material substitution); AI & Food (uncertainty-aware evidence graphs); Emerging Research (hydrocarbon source attribution).

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