



*Proving the
origin of coffee*

Dr Olya Shatova

Why do we exist?



Elevator Pitch Video



Why traceability is important



Food fraud is estimated to cost the global food industry

**US\$30 to
\$40 billion
every year¹**



10% of all commercially sold food products are affected by fraud²



75% of global consumers list brand origin as a key purchase driver³



Recalls cost businesses on average
\$10 million a year⁴



Our message



***If you want to be certain of where something comes from,
you need to test the actual product itself.***



About Oritain



Oritain use forensic science to verify the origin of products.



Founded in 2008 in NZ by Prof. Russell Frew, a **world-leading expert** in using analytical chemistry to trace the origin of products, and **advisor to the UN**.



Developed significant IP in the **traceability of raw and processed food products** as well as in the **fibre** and **pharmaceutical industries**.



Offices in 5 countries with a global **gender split of 50:50**. Partnering with **leading multinationals** providing our services in **20+ countries**.

Current verticals:



Food



Fibre



Pharma



What is new



Oritain-Highlights



Since 2019, Oritain has expanded its database and mapping initiatives



- Analyzed samples from 20+ countries
- Have mapped coffee in Honduras, Indonesia (Sumatra), and Rwanda
- Expect to map coffee this year in Brazil (Cerrado) and Hawaii

Validated methods for origin verification of processed products



- Oritain is able to verify roasted coffee back to its origin, independent of who roasted the coffee

Oritain has grown significantly



- Staff from 30+ to 130+
- Opened an office in the United States
- Growing lab network

The Science



Forensic cases



The science has been developed in the Forensic Chemistry field, this means it is thoroughly tested and acceptable in a court of law.

Oritain has applied the same science to Food, Fibre and Pharmaceutical sectors.



KOREAN SHIP – ‘PONG-SU’



OPERATION ‘COMPASS’



1080 MILK POWDER SCANDAL

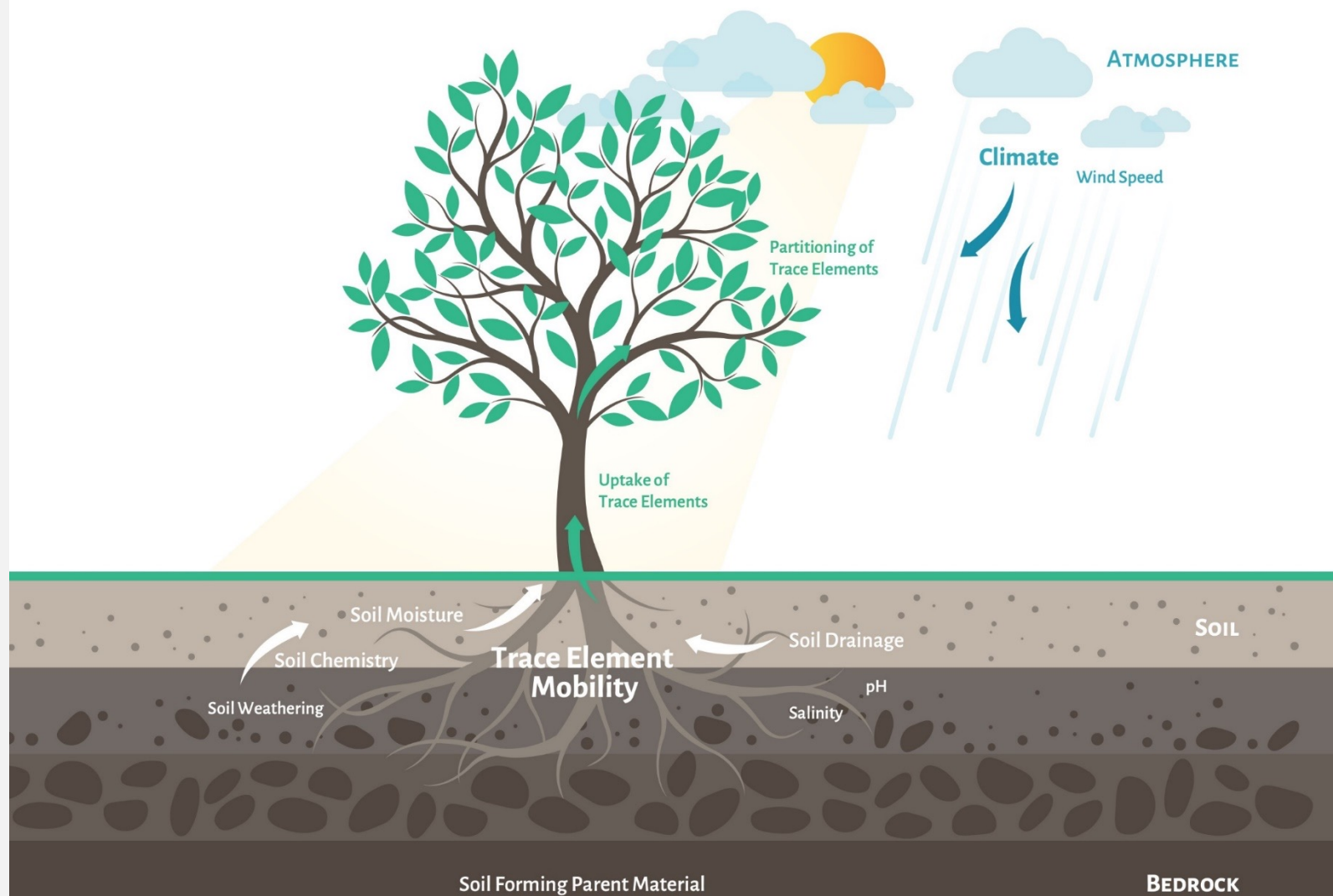


How Nature creates a unique fingerprint:

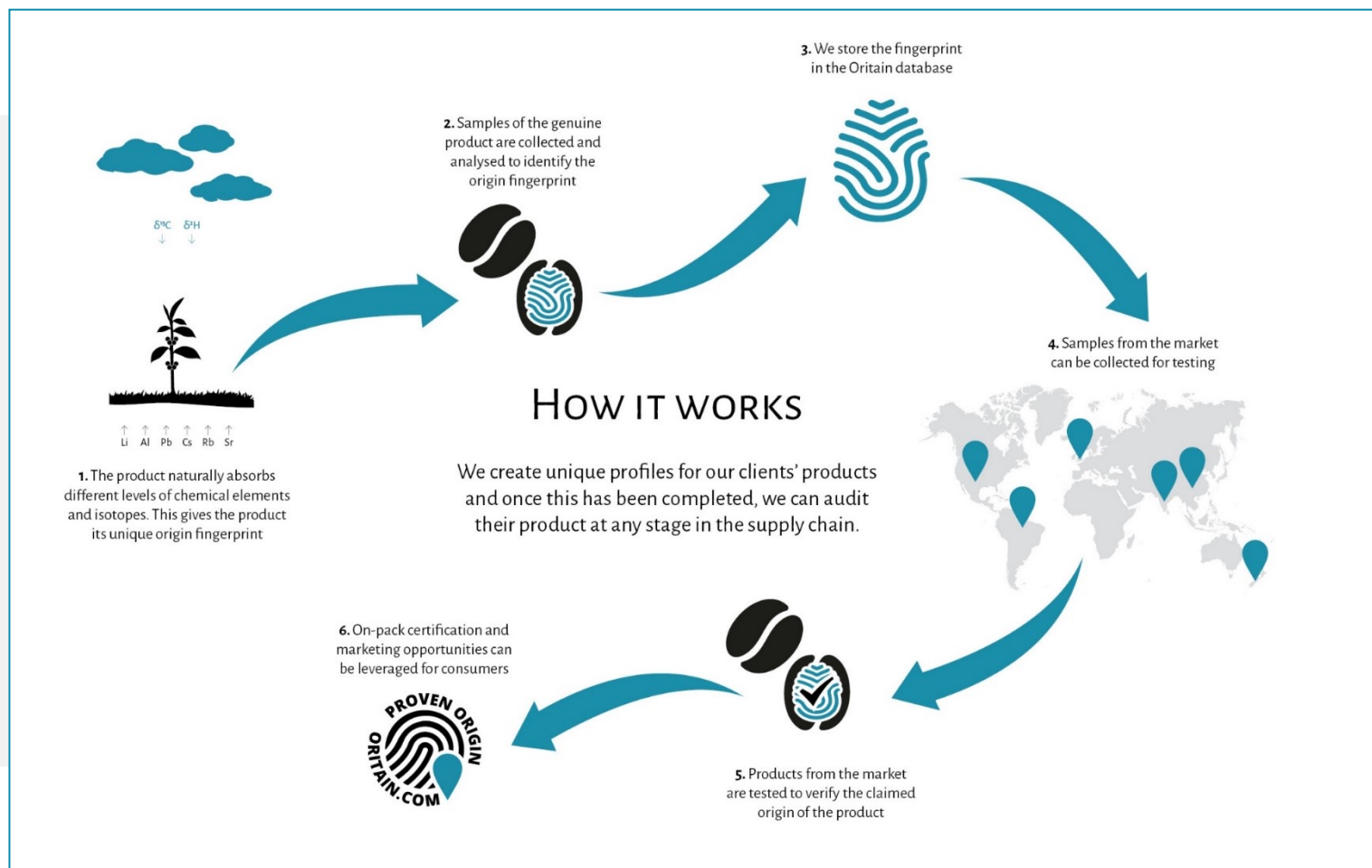


The product naturally absorbs different levels of chemical elements and isotopes.

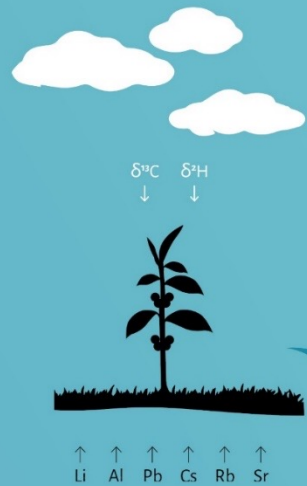
This gives the product its unique origin fingerprint.



Oritain Unique Traceability Service



Origin Verification & Traditional Traceability



Oritain measures the natural intrinsic properties of a product to verify where it has come from. The 'origin fingerprint' of a product cannot be replicated. Oritain can test product from any point of the supply chain to ensure it is true to its claimed origin.



Traditional traceability requires the product to have some form of paper/label based traceability systems. The accuracy of information is only as good as what's claimed on the label. Once these are removed or tampered with, traceability is lost.

Oritain Traceability vs DNA



DNA traceability

- Identifies the variety
- Dependent on prior knowledge of genome sequence of target species/varieties: Development of the pathway can be complex, time consuming and costly
- Variety can be sometimes used as a proxy to the origin, however, the same variety can be propagated elsewhere



Protects the variety, not the grower



ORITAIN

- Verifies provenance through chemical fingerprinting
- Requires a reference database; Sampling regime only required to capture geographic spread of product, which only requires 100's of samples
- Origin is used as a proxy for farming practices and variety



Protects the origin, thus, the grower



Oritain's Capability in Coffee

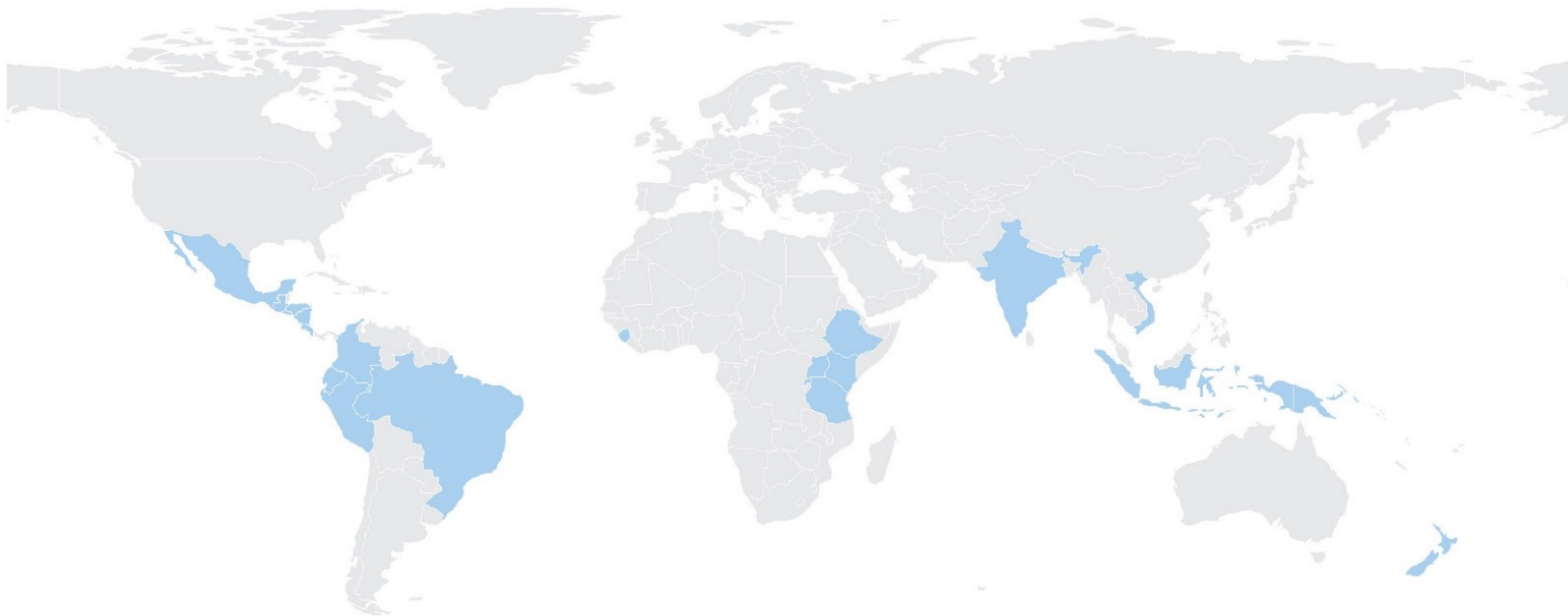


Oritain Coffee map

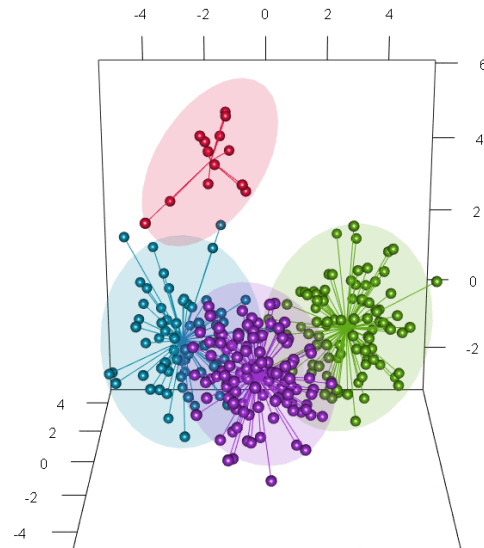


We continue to obtain coffee from around the world to increase our capability

Oritain's current global coffee map



Origin Fingerprint



■ Brazil
■ Honduras
■ Indonesia
■ Rwanda



Each point represents the chemical fingerprint of a sample.



The samples are grouped by country, which is shown using different colors



Statistical modelling is used to identify similarities within the groups



The values of the axes are arbitrary

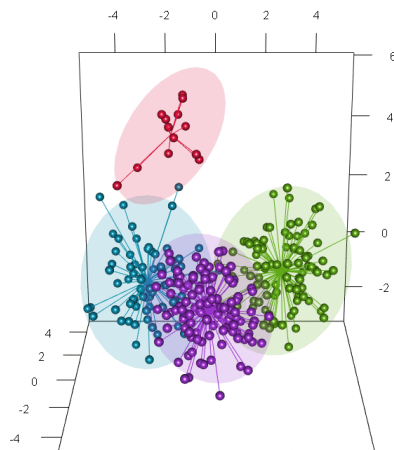
Oritain's Capability at different levels



Science can distinguish origin fingerprints of coffee at different levels according to the customer's needs



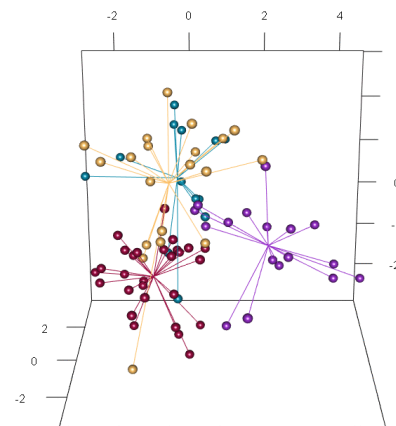
Country



■ Brazil
■ Honduras
■ Indonesia
■ Rwanda



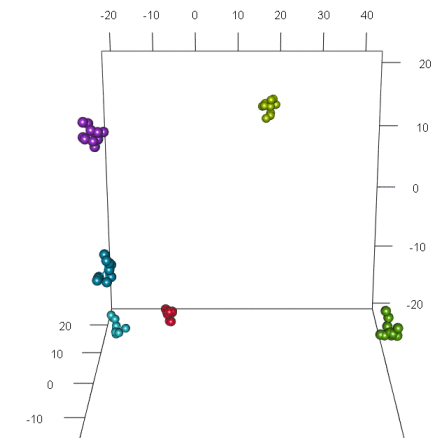
Region



■ Agalta
■ Copan
■ Montecillos
■ Opalaca



Cooperative



■ Florentino
■ Lucas Venturim
■ Maria AM Miran
■ Orlando
■ Pedrom M Souza
■ Versi C. Ferrero

Audits Across the Supply Chain



Origin Resolution



Country



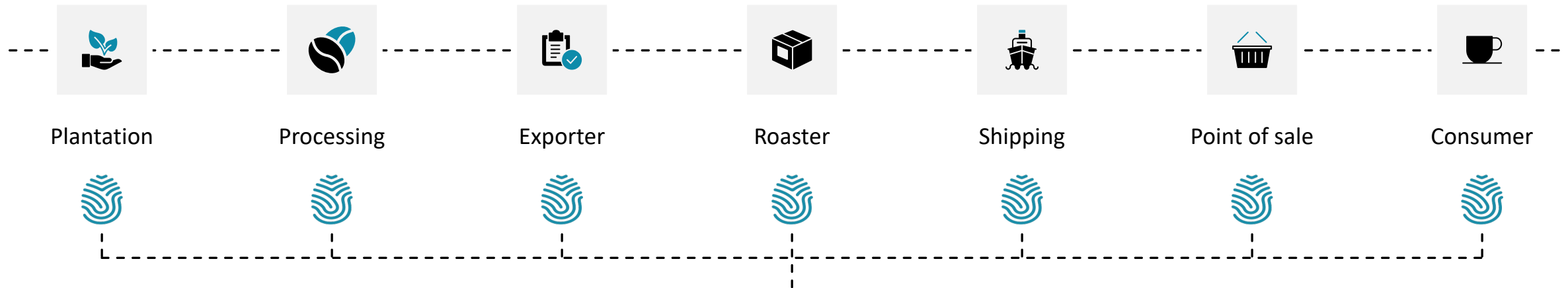
Region



Farm



Batch



We can verify the origin of your product at any point in the supply chain, which enables you to substantiate origin related claims and mitigate risk of substitution or counterfeit product.

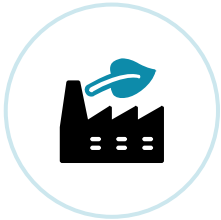
Oritain

Physical, Scientific, Product Verification.



Product Test.

Oritain measures what exists naturally in the product. The addition of foreign tracers such as spray or particles is not required.



Manufacturing Friendly.

No changes to the manufacturing processes are required or integration of machinery / systems.



Commercially Proven.

Forensic science that meets the Daubert Standard, meaning it can be used as evidence in a court of law.

Tests the actual product

To be truly sure where something comes from, you need to test the 'thing' itself. We test the actual product, not the packaging, ensuring the integrity of your product no matter what happens to the label or packaging.

Test anywhere in the supply chain

Our audits only require a small sample of product and so integrate seamlessly into existing supply chain infrastructure. This makes auditing throughout any point of the supply chain – even up to the shop floor – easy and scalable.

Accurate in detecting fraud

Routine auditing identifies fraud in your supply chain. And our forensic science is accurate enough to meet the Daubert standard, meaning that they stand up in a court of law if required.

Works across many industries & supply chains

We work across many product categories throughout the fashion, food, and pharmaceutical industries. We also understand that not all supply chains are similar and work with you to create an auditing program specific to your needs.

Pilot with HCA



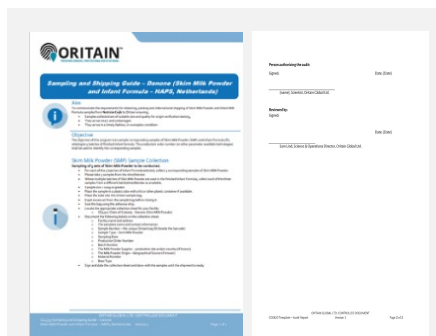
Pilot with HCA - Hawaii Coffee Origin Program



Collection

Sample collection by Customer/Oritain:

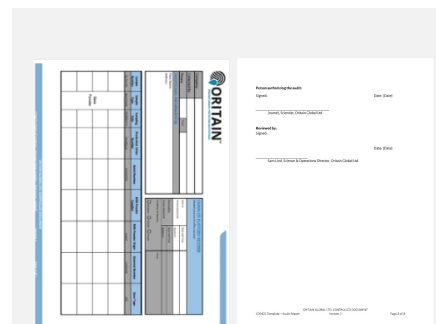
- › Samples collected by either our customer, Oritain or a contracted third party according to our standard operating procedures (SOPs) in Aug - Dec'22



CD1234 Sampling and Shipping Guide

Metadata:

- › Multiple datapoints related to each sample's recorded on a Chain of Custody Form



CD4567 Chain of Custody – (Customer)

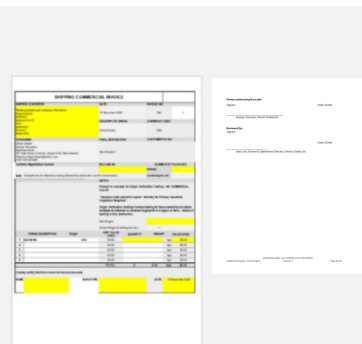
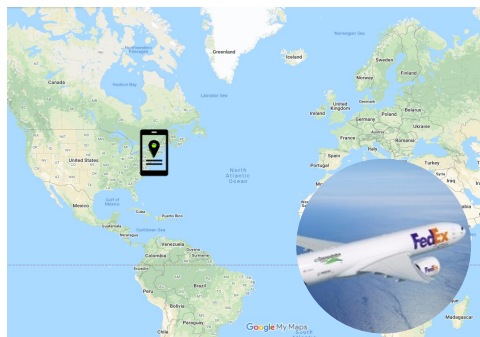


Pilot with HCA - Hawaii Coffee Origin Program



Shipment:

- › Samples shipped securely to Oritain Transitional Facility in New Zealand.



Shipping Commercial Invoice



Registration in Oritain Operating Environment:

- › Samples are assigned a unique ID and associated metadata is registered in the Oritain Operating Environment (OOE).



Pilot with HCA - Hawaii Coffee Origin Program



→ Collection

→ Accessioning

→ Analysis

Shipment:

- › Samples shipped securely to Oritain Transitional Facility in New Zealand.



Analysis:

- › Analysed on IRMS for stable isotopes or ICPMS for trace elements



Data release:

- › Suitability of data assessed following strict quality control guidelines.

ISOTRACE
Results for: Oritain Global Ltd.
Sample set: LAR 2011-11451, LAR 2011-11453, LAR 2011-11511, LAR 2011-11513, LAR 2011-11514
Date: #####
Iso-trace Job Number: 202696/202698/202707/202709/202710

Sample	$\delta^2\text{H}_{\text{SMOW}}$	Hydrogen, % w/w	$\delta^{18}\text{O}_{\text{SMOW}}$	Oxygen, % w/w	$\delta^{13}\text{C}_{\text{VPDB}}$, ‰	Carbon, % w/w
C39539	-25.8	6.00	29.18	19.58	-25.42	38.84
C39539	-26.1	5.81	28.86	19.24	-25.29	38.58
C39539	-25.5	5.94	28.79	19.17	-25.32	38.43
C39532	-24.5	5.86	30.69	18.99	-27.44	38.06
C39532	-23.6	6.04	30.83	19.42	-27.37	38.92
C39532	-25.1	6.06	30.54	19.50	-27.44	39.08
C39527	-24.9	6.00	29.34	19.44	-25.68	38.96
C39527	-24.9	5.68	28.84	18.32	-26.04	36.73
C39527	-23.9	6.02	29.48	19.38	-25.51	38.85
C39540	-29.6	6.04	28.98	19.68	-26.61	39.45
C39540	-30.6	5.99	28.90	19.54	-26.81	39.16
C39540	-30.3	6.17	29.05	20.02	-26.51	40.13
C39530	-22.0	6.07	30.65	19.60	-26.44	39.29
C39530	-21.6	5.97	30.78	19.23	-26.46	38.54
C39530	-22.1	6.08	30.68	19.72	-26.51	39.52
C39531	-20.9	6.15	31.56	19.25	-26.71	38.60
C39531	-18.1	6.24	31.32	19.60	-26.66	39.29
C39531	-20.6	6.12	31.32	19.08	-26.89	38.24
C39528	-80.3	7.70	27.76	13.95	-28.32	27.96
C39528	-89.7	7.78	28.65	14.07	-28.03	28.20
C39528	-91.1	7.68	28.47	13.99	-28.08	28.05
C39533	-34.0	6.02	30.91	19.35	-25.85	38.79
C39533	-28.9	6.06	30.00	19.54	-25.59	39.16
C39533	-29.0	6.00	30.37	19.55	-25.60	39.19

Pilot with HCA - Hawaii Coffee Origin Program



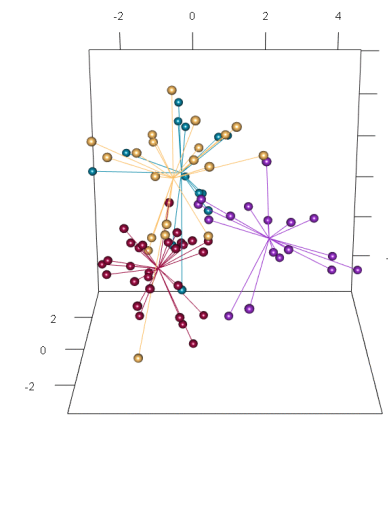
Statistical Interpretation:

- › Raw data is processed using a set of statistical tools.

```
25 # set database directory - if copying from windows consider to change "C:" to "/"
26 data.directory = "C:/Users/ishatova/Documents/0_data_and_models/Cotton/secret shopper stuff/prec
27
28 # set output directory
29 output.directory = "C:/Users/ishatova/Documents/0_data_and_models/Cotton/secret shopper stuff/prec
30
31 # set working directory - where output goes
32 setwd(output.directory)
33
34 # code directory - "C:/Users/ishatova/Documents/0_data_and_models/0-tools v4.5 current 27032020/"
35
36 # set global variables
37
38 data.file = "200421_cotton_isotopes_05_hufts.csv"
39
40 identifier = "05_44" # the user-defined identifier that will append to the end of each output f
41 time.stamp = format(Sys.time(), "%Y%m%d_%H%M%S") # append time stamp in the output file name e.g. "20
42 what.group = "origincheck"
43
44
45 non.detect.thresh = 30
46
47
48 # read in the data
49 data.df = read.csv(paste(data.directory,data.file,sep="")) # data.df - the complet
50 str(data.df) # check the data is available
51
52 first.cle = "0580" # the first and last element (including isotopes if any) in the dataset.
53
54 # choose the classification model you wish to fit
55
56
57 # Multi-class log
58
59 # Logistic regression
60
61 # Random forest
62
```

R-Tools –a set of R scripts and packages developed specifically for origin verification

- › Regional fingerprints of coffee created
- › Blending R&D run



3D graphical representation of a statistical model with an example audit



Pilot with HCA - Hawaii Coffee Origin Program



Report

- › Oritain will furnish a summary report demonstrating the outcomes and recommended next steps.



Is the sample of coffee consistent with the Claimed origin of Hawaiian coffee?

☐ Yes

☐ No



Hawaii Coffee Association



Our impact





Oritain scientific verification services:

- Provide comfort that product is from a known origin.
- Reduces risk and helps detect non-compliance.
- Helps substantiate responsible sourcing claims and compliance with labour and environmental standards.

PRODUCTS WE WORK WITH



Cocoa



Soya



Leather



Cotton



Wool



Coffee



Minerals



Pharmaceuticals



Others



Red meat



Horticulture



Palm



Dairy



Rice



Timber



Seafood



Tomatoes

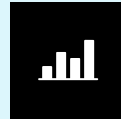
Stakeholder benefits and impacts across your organization



Board of Directors

Protect the interests of the shareholders:

Independent, scientific traceability gives Directors peace of mind, knowing their business is doing the utmost to reduce risk for consumers and shareholders alike.



CFO

Manage the Risk Register:

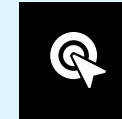
Our scientific traceability helps manage risk by reducing the likelihood and impact of fraud acts in the supply chain, as well as offering insights into supply chain risk.



R&D / Science

Collaborate to combine Oritain science with your R&D:

Science design, commercialization and R&D are a big part of what we do. We often partner with client R&D departments to share learnings, experience and/or collaborate on projects to help reduce time, energy and costs.



Marketing

Protect brand and provide differentiation:

Supply chain transparency is vital to communicating sustainability, animal welfare and environmental claims. The reassurance of independent verification can positively enhance these messages to both your consumers and stakeholders.



Legal Counsel

Ensure your business is not legally liable:

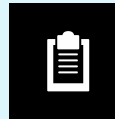
Independent, scientific traceability helps to protect brand equity and IP for shareholders. It also shows that you've taken all known measures to protect your product and reduce the risk and potential harm to consumers that may result from fraud.



Sales

Leverage Oritain as a USP to deepen customer relationships:

Going above and beyond to trace your product and prove your sustainability claims often has a positive impact on the customer. It shows your business is taking innovative measures to ensure they receive products of the highest integrity.



Quality Assurance

Ensure the quality of your products:

The ability to randomly and independently audit the supply chain gives your QA department a tool to ensure that the products you receive, or sell, are true to label.



Procurement

Helps ensure your supply is safe:






Verify the origin of the products you purchase and produce, ensuring they are true to the quality you and your customers expect.

Our Partners



A selection of global clients



 GE Healthcare		 WOOLMARK	 KERING				 MOHAIR
 COUNTRY ROAD		 COTTON USA		 PRIMARK			
 AUSCOTT LIMITED	 SUCAFINA	 LEWIS ROAD CREAMERY New Zealand					
 Cone Denim							
 The a2 Milk Company	 J.G. BOSWELL COMPANY - SINCE 1925 -	 COTTON AUSTRALIA					
 ANFIC Orchestrating for the Future		 Deloitte.		 THE WORLD BANK		 Gap Inc.	



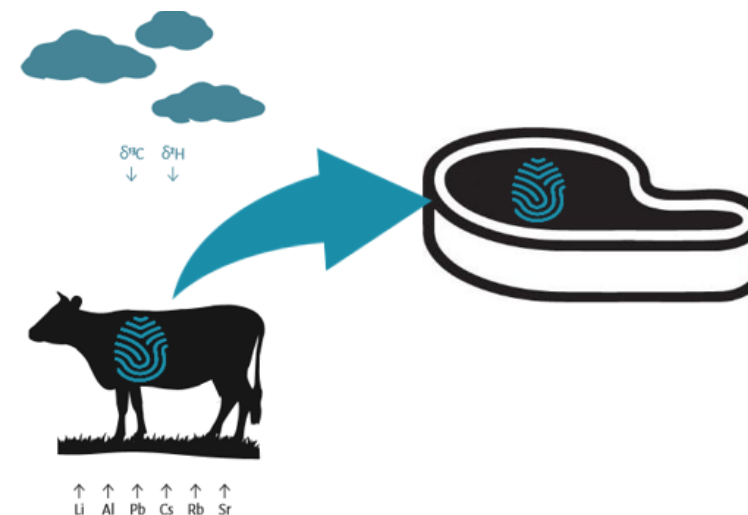
What our clients say



“

This is a significant tool for detecting and preventing product substitution”

- Ian Jenson, Program Manager Market Access
Science & Technology, Meat & Livestock Australia



MLA's purpose is to foster the long-term prosperity of the \$28bil Australian red meat and livestock industry. Australia exports red meat and livestock to more than 100 countries, representing over 60% of the industry's production. This makes it critical to protect and expand access to overseas markets.



What our clients say



“

Independent product verification by food traceability experts Oritain to ensure in-market product authenticity”

- A2 Milk Company



The a2 Milk Company has revolutionized the dairy industry with their premium branded a2 Platinum® products. With a reputation for innovation, their solution for ensuring product authenticity follows suit, working with Oritain to scientifically verify the origin of their products.





**WARNING: FOLLOW DIRECTIONS EXACTLY. PREPARE
TLES AND TEATS AS DIRECTED. DO NOT CHANGE
PORTIONS OF POWDER EXCEPT ON MEDICAL ADVICE.
CORRECT PREPARATION CAN MAKE YOUR BABY VERY ILL.
NOT INTENDED TO USE FOR INFANTS UNDER
MONTHS OLD.**

- Is this a True a2™ product?

Take great care to ensure you have the highest quality products. Our milk is sourced from cows that produce milk with only A2 type beta-casein protein and free from growth hormones and antibiotics. **a2 Platinum®** is also verified by independent food-traceability experts, Oritain. **What else can you do?** Scan to verify the authenticity of the QR code on the base of this can.



atinum® Premium follow-on formula
ed on a unique whey and casein blend
icows' milk where the beta-casein protein
aranteed to be only the natural
ype and not a synthetic

Feeding Guide

AGE OF COOLED SCOOPS OF
BOILED POWDERA PER DAY

- Is this a True a2™ product?

We take great care to ensure you have the highest quality products. Our milk is sourced from cows that produce milk with only A2 type beta-casein protein and is free from growth hormones and antibiotics. **a2 Platinum®** is also verified by independent food-traceability experts, Oritain. **What else can you do?** Scan to verify the authenticity of the QR code on the base of this can.





Q&A
