Multi-Marker DNA Sequencing Approach for Food Analysis: Clear Labs' Unique Platform

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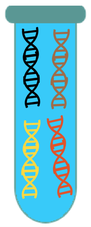
Introduction

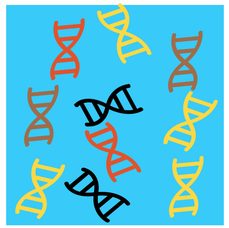
- This presentation outlines the applications of amplicon-based DNA Barcoding and Whole Genome Sequencing (WGS) using Next-Generation Sequencing (NGS) in analyzing the exact contents of food products.
- This approach to food safety and authenticity blindly generates a plethora of consistent and thorough results from a single test.
- Clear Labs has developed its unique platform to capture all genetic information in a given food sample.

Methods

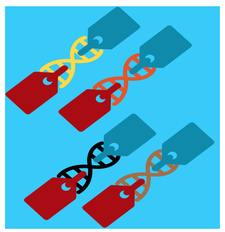
Approximately 200 mg of homogenized sample is collected in a tube aseptically.



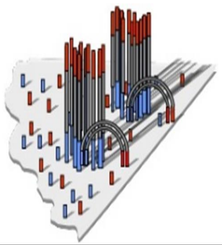
Total DNA content is extracted and purified with the Macherey-Nagel Nucleospin Kit.



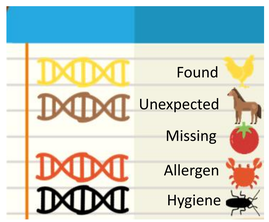
Multiplex PCR targets universal and specific barcoding regions to generate a complete genetic profile.



Indexes attach to each sample and act as adaptors for sequencing, providing each sample with a unique molecular identity.



NGS allows up to 800 samples to be sequenced simultaneously through bridge amplification.

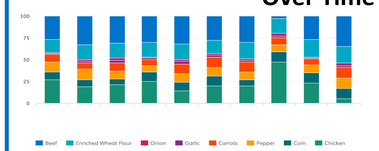


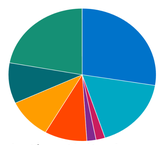
Bioinformatic analysis against curated internal and public databases are utilized to identify species present in each sample.

Applications

Universal NGS-Based Multi Marker Sequencing

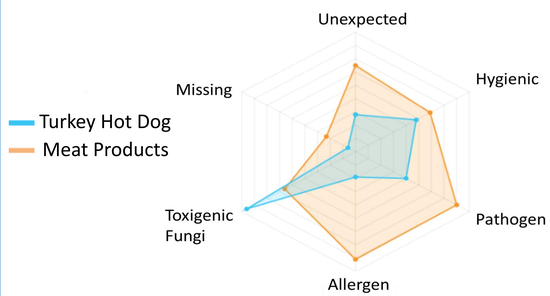
Authenticity: Trends in a Single Product Content Over Time



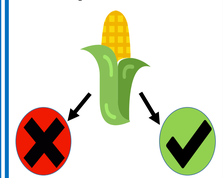


Authenticity Averages

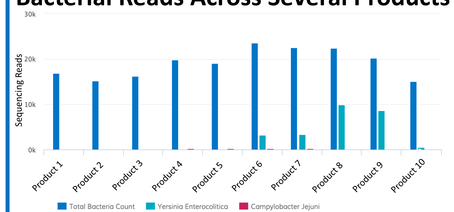
Findings Distribution: Single Product and Entire Category



Really GMO Free?



Safety: Relative Pathogenic and Bacterial Reads Across Several Products



New Features:

Clear Labs has implemented its database to provide comprehensive information regarding bacterial and pathogenic trends and origins with its Whole Genome Sequencing and Microbiome Projects.

Conclusion

As multiple foodborne illness outbreaks and food recalls this year alone demonstrate, ensuring quality in and moderating a complex supply chain is a formidable challenge. Studies published from Clear Labs attest to this; for instance, mislabeling rates were found to be as high as 16.3% and 14.4% among 172 seafood products from restaurants and 345 hot dogs from major American retailers, respectively.

Clear Labs, having sequenced over 10,000 food samples of 12 categories from both international and domestic sources, has proven capable of detecting such issues. Their strategic implementation of Next Generation Sequencing and a robust bioinformatics pipeline generates multiple reliable results from a variety of samples simultaneously and acts as a blind test for authenticity and safety. This comprehensive approach is capable of capturing genetic information from a vast range of organisms, including animals, plants, fungi, pathogens, microorganisms, allergens, and GMOs. Clear Labs has also expanded their platform to include Whole Genome Sequencing and Microbiome testing, both of which enable the active and predictive monitoring of pathogen activity and origin.

The quality of food is of greater importance today than ever; consumers have become more health-conscious and aware of their dietary choices with the age of information. Clear Labs' robust, universal platform, if implemented scalably, would significantly increase consumer trust, fundamentally improve the industry's approach to safety problems, and ultimately increase the quality and standards of the food industry as a whole.

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