

SAFESeqr

Fast and Robust Food Authenticity Testing using Next-Generation Sequencing (NGS)

Abstract

SAFESeqr provides a complete solution for food authenticity test with the development of SAFESeqr Kit for NGS library preparation and SAFESeqr Suite analysis software. SAFESeqr delivers robust, specific, and fast identification of up to 1842 eukaryotic species and 1161 eukaryotic genus. Combining SAFESeqr one-step PCR library preparation workflow and the Illumina MiSeq NGS platform, it is capable of detecting resolving complex and low level sample mixtures requiring only 2ng of input DNA. SAFESeqr complete solution with the highest-quality data generated can be easily visualized and reported using the SAFESeqr Suite analysis software.

Overview

SAFESeqr is developed as a complete sample-to-report solution for both research and applied market. SAFESeqr utilizes the targeted amplicon sequencing workflow by Illumina where customized region-of-interest is amplified from the samples and sequenced in Illumina MiSeq NGS platform. This short region-of-interest (approximately 100 bp) in mitochondrial 12S rRNA gene was determined through our in-house bioinformatics pipeline from *BioEasy Sdn Bhd* (Malaysia). Currently, based on the available curated mitochondrial database in NCBI, this region-of-interest is capable of identifying up to 1842 eukaryotic species and 1161 eukaryotic genus. Together, SAFESeqr entire workflow from sample-to-report takes less than 20 hours to complete.

SAFESeqr Kit

SAFESeqr Kit (Catalog # SQ-4896-11) contains 12 forward primers and 8 reverse primers. These primers contain a universal sequence to target the region-of-interest, while having different index sequences for multiplexing purpose. These index sequences provide the users with the flexibility in preparing up to 96 multiplex sequencing libraries with 96 different index combinations. Figure 1 showed the SAFESeqr one-step PCR library preparation workflow.

SAFESeqr is optimized for 48 samples per run in a MiSeq Reagent Micro Kit v2 (Catalog # MS-103-1002); while 96 samples per run in a MiSeq Reagent Kit v2 (Catalog # MS-102-2002).

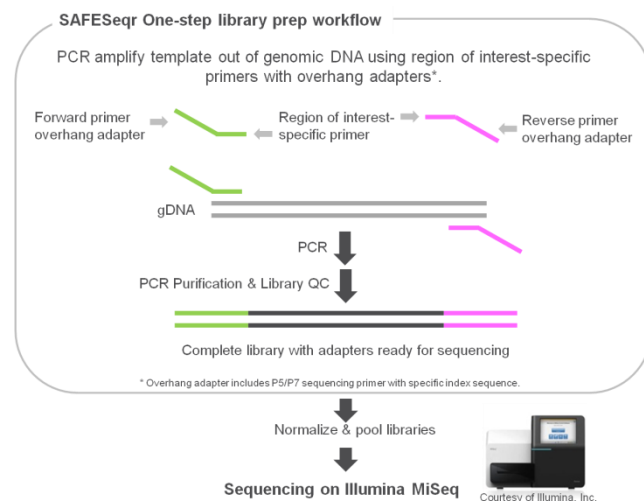


Figure 1: SAFESeqr One-step Library Preparation Workflow

SAFESeqr Suite



SAFESeqr Suite analysis software is a point-and-click user interface software. This software automatically analyzes the raw data obtained from Illumina MiSeq sequencer. With only 4 clicks, analyzed report can be generated and ready for printing.

SAFESeqr Suite comes in 2 options; either users purchase the SAFESeqr Suite analysis software (Catalog # SS-011) with an annual license for one computer or SAFESeqr Suite Box Solution (Catalog # SS-021) which comes with an annual license of SAFESeqr Suite analysis software for one computer together with the specified hardware.

Performance

The performance of SAFESeqr was tested based on its specificity, sensitivity, reproducibility and ability to detect mixture samples (Figure 2A). In-house tests were performed on different food variety including processed food, for example chocolates, sausages, meatball, burgers and etc (Figure 2B). To further explore the ability of SAFESeqr, we tested not only on food samples, we also go beyond to animal feeds and wildlife samples (Figure 2B).

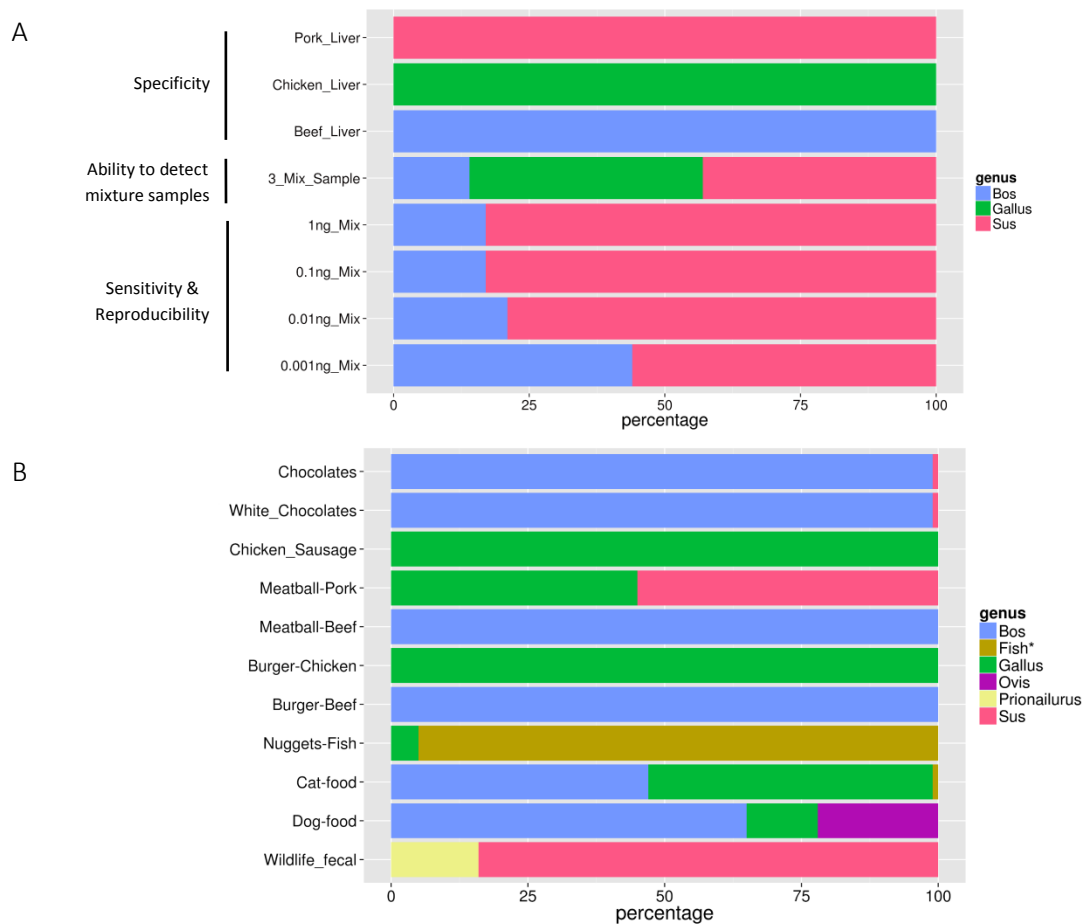


Figure 2: A. The specificity, sensitivity, reproducibility and ability of SAFESeqr to detect mixture samples. **B.** The flexibility of SAFESeqr on a wide variety of samples, including animal feeds and wildlife samples. (*) represents the different types of fish.

Conclusion

SAFESeqr complete solution delivers a fast and robust method to identify each of the eukaryotic contents, and also providing relative percentage of each contributor in the samples. Comparing to real-time PCR method of detection, SAFESeqr does not required any prior information on who is presence in the samples. SAFESeqr basically sequence everything and anything from the prepped library, from the DNA template itself. We believed that with SAFESeqr one-step PCR library preparation workflow combining the gold standard sequencing platform - Illumina, it is capable of generating the best quality data that gives users the highest confident on their results.

Link to website

www.sciencevision.com.my/safeseqr/

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