MACHEREY-NAGEL

NucleoSpin® 96 Food

DNA purification from food and feed samples using the Hamilton® [MPE]^2 positive pressure module

Introduction

Rapid analysis of foodborne pathogens via molecular detection methods have major advantages compared to (time consuming) classical culture based methods. Especially, the isolation of genomic DNA from food and feed samples is widely performed with the purpose of species identification, GMO testing, or detection of foodborne pathogens.

One common issue during DNA isolation from food and feed samples, is the vast diversity in terms of consistency and composition. Food samples are very heterogeneous and contain many different components like lipids, polysaccharides, and high content of proteins, which are released during DNA extraction. In subsequent biomolecular applications these compound related interferences have a strong impact by, e.g., interaction with nucleic acids or disturbing DNA polymerase activity. Furthermore, processed and complex food matrices often exhibit a very low and degraded DNA content.

MACHEREY-NAGEL has developed the NucleoSpin® 96 Food kit for DNA extraction from diverse challenging food matrices. Due to its robust buffer chemistry and a resilient silica membrane, the kit has proven to work with a variety of challenging samples. MACHEREY-NAGEL is continuously expanding its collaborations with automation partners in order to offer more support to high throughput customers. We now present the first implementation of the NucleoSpin® 96 Food kit on a positive pressure unit using the [MPE]^2 positive pressure module from Hamilton®. The [MPE]^2 module maintains equal pressure across the NucleoSpin® Food Binding Plates eliminating the possibility of uneven flow through. Our optimized protocol allows the processing of 96 samples within approximately 90 to 120 minutes (excluding sample pretreatment), depending on platform setup.

Product at a glance

NucleoSpin® 96 Food	
Technology	Silica membrane technology
Sample material	< 200 mg food or feed
Preparation time	Approx. 90–120 min depending on platform setup
Typical yield	0.1–10 µg
Elution volume	100–200 µL
Theoretical binding capacity	30 µg

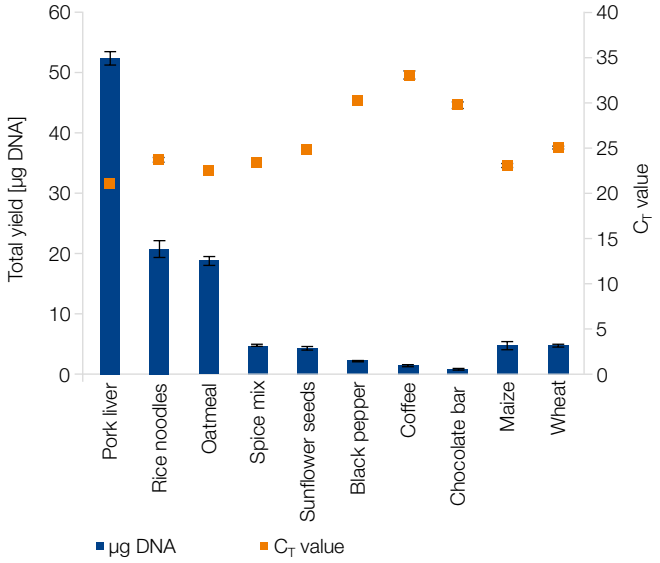
[MPE]^2	
Technology	Monitored Multi-flow, Positive Pressure Evaporative Extraction
Sample volume	Optional reagent fill module with up to 15 reagent bottles
Capacity	24 / 48 / 96 samples
Size / weight	44.5 x 15.9 x 18.1 cm / 6.9 kg

Material and methods

After the food samples have been homogenized, the DNA can be extracted with Lysis Buffer CF. The cleared supernatant of the lysis mixture is subsequently applied to Binding Buffer C4 and ethanol to create conditions for optimal binding to the silica membrane of the NucleoSpin® Food Binding Plate. The following washing and elution steps are performed on the [MPE]^2 positive pressure module.

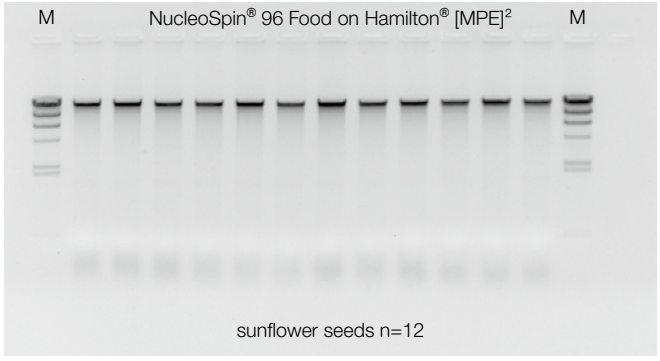
An optimized protocol and plate stack assembly enables the purification of highly pure genomic DNA using the MN Wash plate. The MN Wash Plate is a microtiter plate open on both sides thus allowing free flow through generating 96 separate channels. During the washing steps of the developed protocol the MN Wash Plate is placed underneath the [MPE]^2 adapter frame. The NucleoSpin® Food Binding Plate is placed on top of the [MPE]^2 adapter frame. This plate stacking prevents the bottom of the NucleoSpin® Food Binding Plate to be contaminated and the flowthrough is drained away from the plate directly into the waste reservoir. Resulting eluates are ready to use in all types of subsequent detection methods, especially in real-time and basic PCR technologies and can be used for the identification of GMO DNA or animal components in food and feed.

Application data



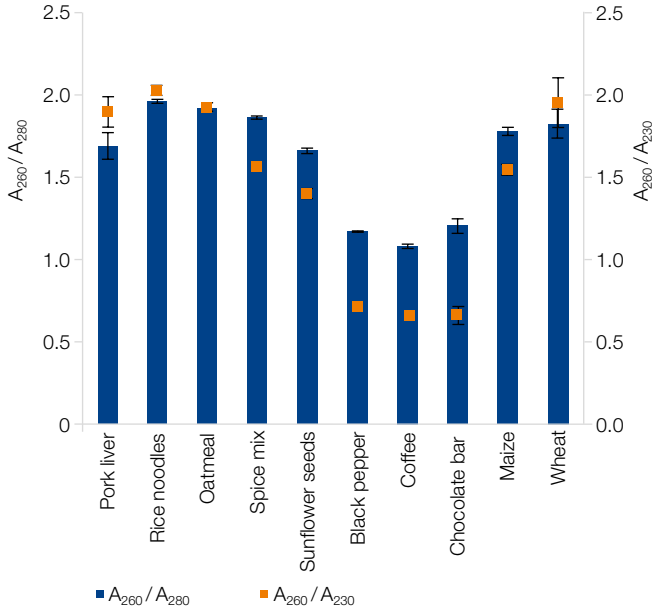
Extraction of DNA from various food and feed samples using the [MPE]^2 unit

DNA was isolated from different food and feed samples (n = 12) using the NucleoSpin® 96 Food kit on the [MPE]^2 unit from Hamilton®. Starting material was 100 mg/prep for oat meal, spice mix, sunflower seeds, coffee, black pepper, and 200 mg/prep for pork liver, rice noodles, black pepper, chocolate bar, maize, and wheat. Total yield was determined by UV spectrometry (dark blue bars). A subsequent qPCR analysis was performed for a 103 bp Actin amplicon or a ß-Actin amplicon for pork liver samples using the SensiFast™ Probe Lo-ROX-Kit from Bioline on an Applied Biosystems® 7500 Real-Time PCR System.



Integrity of isolated DNA from sunflower seeds

The integrity of the isolated nucleic acids from sunflower seed samples (n = 12) was analyzed by gel electrophoresis (10 µL per eluate; 1 % TAE gel; M: Lamda DNA/Hind III–Thermo Scientific)



Purity of isolated genomic DNA from different food and feed samples

DNA was isolated from different food and feed samples (n = 12) using the NucleoSpin® 96 Food kit on the [MPE]^2 unit from Hamilton®. Starting material was 100 mg/prep for oat meal, spice mix, sunflower seeds, coffee, black pepper, and 200 mg/prep for pork liver, rice noodles, black pepper, chocolate bar, maize and wheat. The purity was determined by measuring A_{260}/A_{280} and A_{260}/A_{230} values via UV spectrometry.

Automate your genomic DNA extraction from food and feed samples

MACHEREY-NAGEL and Hamilton® deliver a sophisticated solution for your high throughput genomic DNA extraction. The NucleoSpin® 96 Food kit procedure can be easily adapted for the [MPE]^2 positive pressure module to speed up your food and feed sample extraction workflow.

- Processing of various food and feed sample material using NucleoSpin® 96 Food on the [MPE]^2 positive pressure module
- Reliable performance and excellent DNA yields for e.g., species identification and GMO detection
- Compact and automated gDNA isolation of 96 samples in 90–120 minutes

Ordering information

Product	Specifications	Preps	REF
NucleoSpin® 96 Food	Kit based on silica membrane technology for the isolation of genomic DNA from tissue samples in 96-well format	2 x 96 / 4 x 96 / 24 x 96	740976.2 / .4 / .24
MN Wash plate	Plate to minimize the risk of cross-contamination	4 / 24	740479 / .24
[MPE]^2	Monitored multi-flow, positive pressure evaporative extraction module with 96 air manifold and evaporator		96160-04*

*For more detailed information, please visit www.hamiltoncompany.com/robotics. To find a Hamilton subsidiary or distributor in your area, please visit www.hamiltoncompany.com/contacts.