Food Safety Testing Solutions by QIAGEN

Catch it real-time

A fully integrated system for comprehensive food safety testing

QIAGEN®

Sample & Assay Technologies

Meeting the challenges of global food distribution

In a globalized food market with increasing demand for food research and monitoring, there is a need for streamlined testing solutions that are sensitive, accurate, and easy to use with a variety of starting materials. Real-time polymerase chain reaction (PCR) is gaining importance as a complementary tool to established microbial culture-based methods and ELISA-based assays prevalent in the food testing sector. Combined with dedicated sample preparation kits, real-time PCR assays deliver rapid results from a broad spectrum of sample materials and simplify the testing process.

A modern method for food testing

Clear advantages account for the popularity of molecular-based testing:

- Real-time PCR delivers results in approximately 3 hours
- Real-time PCR accurately detects challenging pathogen strains
- Protocols are simple and can be automated for high sample numbers
- Real-time PCR is highly specific and unaffected by food processing

An integrated testing system that meets your demands

Today's high-quality food safety testing program places demands on testing assays, as well as sample preparation methods:

Top performance

Assays must be sensitive, specific for the tested target, and resistant to inhibition of detection. This performance is dependent on the quality of input material and thus, sample preparation methods must be effective.

Ease of use

Both sample preparation methods and detection assays must be based on streamlined, robust, and user-friendly protocols that are easily adapted to varied applications.

Speed

Sample preparation must involve minimal effort and, if possible, should be automatable to process high sample numbers. The detection assays must deliver rapid results and accommodate high throughput.

Coverage

Sample preparation methods must accommodate a broad range of sample types while delivering efficient extraction with a streamlined protocol. In addition, the detection assays must cover a wide range of known food contaminants or pathogens.

Standardization

Both sample preparation and detection assays must integrate into a consistent workflow, allowing standardization of sample processing.

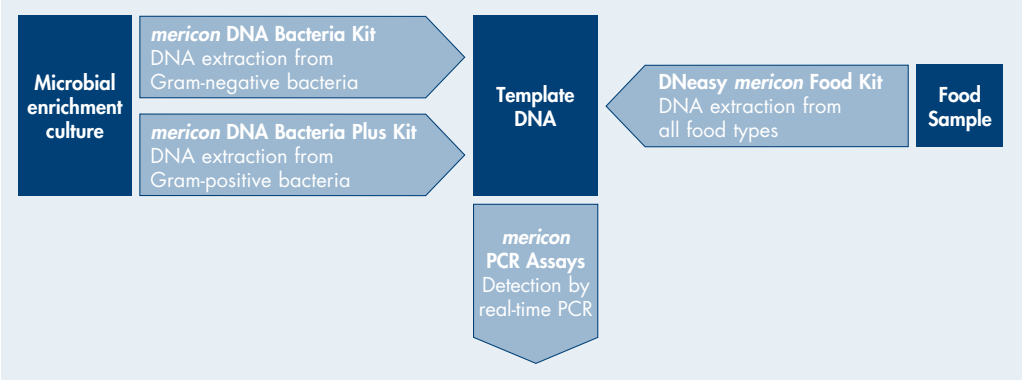


Figure 1. A two-armed workflow for food safety testing. Whether testing for pathogens, genetically modified organisms, allergens, or animal and plant matter, the *mericon* food testing portfolio delivers solutions for a streamlined sample preparation workflow and a fully standardized detection protocol.

Key features that simplify food safety testing

The *mericon*™ food testing portfolio is a complete system of assay kits that meet the demands listed above. Based on detection by real-time PCR, *mericon* PCR Assays and sample preparation kits enable fast and reliable detection of a broad range of pathogens, genetically modified organisms, allergens, and plant and animal matter in food, animal feed, or pharmaceutical products. A major advantage of the QIAGEN setup is harmonized detection protocols across the portfolio, resulting in workflows that differ only in sample preparation method (Figure 1). Complementing the aligned PCR-based detection assays, QIAGEN offers new sample preparation solutions specifically designed to process a variety of food materials, providing an optimal overall workflow performance. These sample preparation kits efficiently extract DNA from microbial enrichment cultures as well as directly from various food matrices, while minimizing the carryover of PCR inhibitors inherent to complex food samples.

Sample preparation that is universal, simplified, and rapid

Our sample preparation kits are designed to enable DNA extraction from diverse sample types, starting either from a microbial enrichment culture or from raw or processed food material. Particularly noteworthy is the improved CTAB-based extraction method of the DNeasy® *mericon* Food Kit. The nonionic detergent CTAB is widely used for efficient extraction of total cellular nucleic acids from a wide range of tissue types. CTAB can be adjusted to either efficiently liberate and complex with DNA or to remove cellular inhibitors. Compared to conventional, labor-intensive CTAB extraction protocols, the protocol of the DNeasy *mericon* Food Kit is significantly faster, accomplishing up to 30 extractions in 2.5 hours with a radically reduced number of workflow steps (Figure 2). The extracted DNA is of equal quality and purity as that extracted with conventional CTAB protocols.

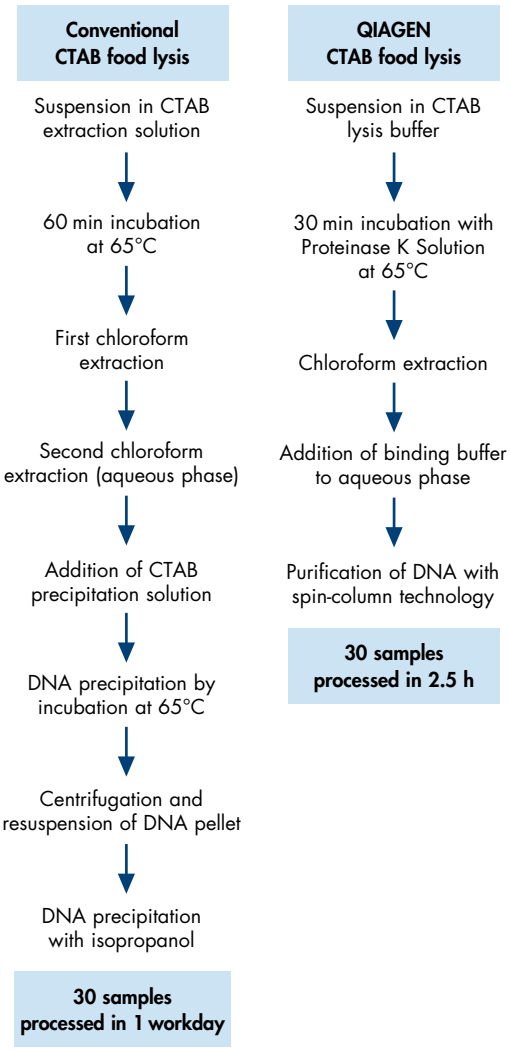
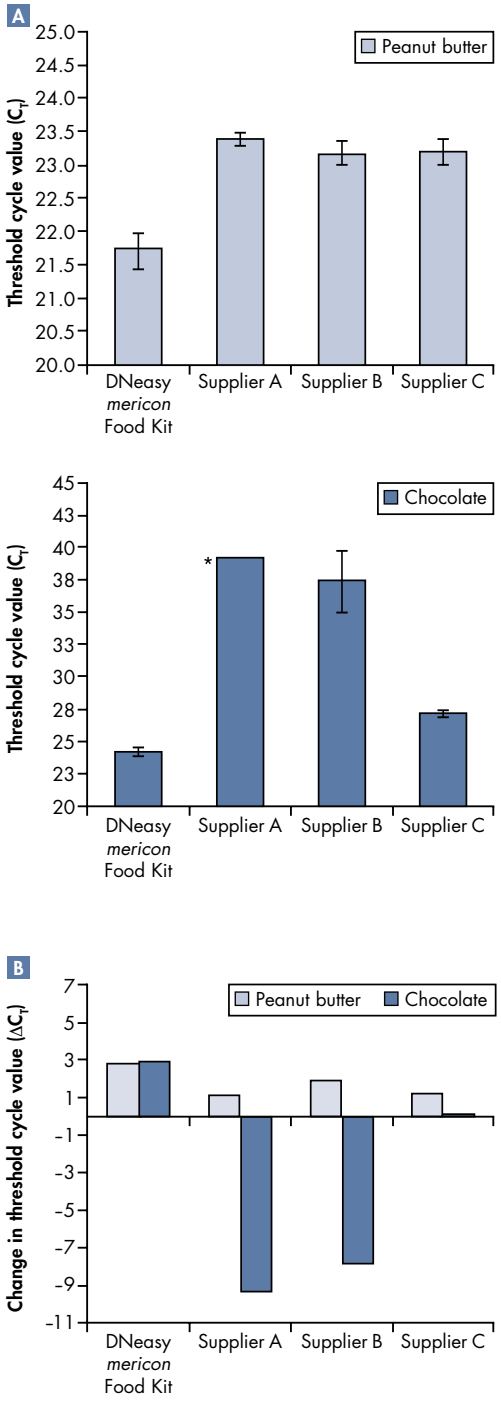


Figure 2. Efficient and rapid DNA extraction. The DNeasy *mericon* Food Kit enables DNA extraction from all food samples in radically shorter time compared to conventional CTAB protocols and with high recovery of short DNA fragments. Times given include handling and instrument time.



During production, food is subjected to heat, irradiation, high pressure, and changes in pH which lead to DNA degradation and fragmentation. The optimized chemistry of the DNeasy *mericon* Food Kit was developed to recover short DNA fragments (down to 100 bp) ensuring that even highly fragmented DNA is efficiently isolated and subsequently amplified in PCR. With these features, extraction with the DNeasy *mericon* Food Kit is a universally applicable extraction method that generates optimal and reliable results even when using strongly inhibitory, highly processed, fatty, acidic, high, or low DNA content foods (Figures 3 and 4). In addition, establishing multiple lysis procedures for different food matrices is no longer necessary.

Short time to result and adaptable throughput

Testing of a food sample, from sample preparation and assay setup to detection by real-time PCR, takes approximately 3 hours. Furthermore, the simplicity of the protocols makes the workflow adaptable to application- or laboratory-specific throughput requirements, making even a high-throughput food safety testing program that covers multiple targets and sample types, feasible and efficient.

Highly sensitive and specific detection of targets

Real-time PCR is a very sensitive and highly specific detection method. To further increase the sensitivity and specificity of *mericon* PCR Assays, the kits include Multiplex PCR Master Mix, which features highly efficient HotStarTaq *Plus* Polymerase, patented multiplex PCR technology such as Factor MP, and fast cycling technology including Q-bond®. These features create a reaction environment that is sensitive, specific, efficient, and highly resistant to PCR inhibitors found in food sample matrices (Figure 4). Generally, the sensitivity of each *mericon* PCR Assay is as little as 10 target copies in a reaction. The specificity of each kit has been tested against large sets of non-target DNA from related species.

Figure 3. High yields of DNA and minimal inhibitor carryover. Peanut butter and chocolate (difficult and highly inhibitory food matrices) were prepared using the standard protocol of the DNeasy *mericon* Food Kit and kits from 3 other suppliers to amplify a segment of the trnL chloroplast tRNA gene. **A** Threshold cycle values (C_T) are lower for samples prepared with the DNeasy *mericon* Food Kit compared to the other kits. **B** Performed with pure DNA, this assay gives a positive C_T shift of 2.9–3.5 when a sample is diluted 1:10. Lower shifts indicate the presence of PCR inhibitors. Samples were diluted 1:10 and the same DNA segment was amplified. Eluates prepared with the DNeasy *mericon* Food Kit were free of inhibitors, as evidenced by C_T shifts of approximately 3. Eluates prepared with the other kits showed strong inhibitor contamination. All data were normalized to a fixed sample input to account for differences in kit input amount, dilution steps, and elution volume.

* Only one replicate resulted in DNA amplification.

Validated workflow solutions

The entire workflow for food safety testing using *mericon* sample preparation kits and *mericon* PCR Assays has been validated. *mericon* PCR Assays perform optimally on the Rotor-Gene® Q real-time PCR instrument, but have been validated for block thermal cyclers as well. The described analytical PCR procedure allows the customer to perform analysis according to local official requirements. In addition, *mericon* PCR Assays are fully licensed for use of PCR, eliminating any additional costs.

Uniform and all-inclusive kit format

All *mericon* real-time PCR kits contain the same components: target-specific primers and probes, an internal control to indicate possible PCR inhibition, a target-specific positive control, and all reagents necessary to perform the PCR assay. The real-time PCR protocol has been standardized across the portfolio so that the same cycling conditions are used for every target. Thus, a standardized detection procedure can be used for all targets within all testing segments and a variety of targets can be analyzed within a single thermal cycler run.

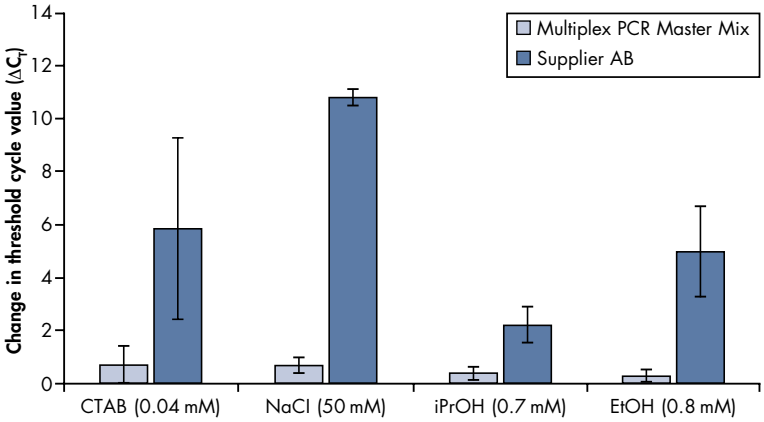


Figure 4. Heightened resistance to inhibitors. A plasmid carrying an artificial DNA sequence (DNA model TaqMan® System; 10^8 copies) was amplified in reactions spiked with inhibitors and containing the Multiplex PCR Master Mix supplied with *mericon* PCR Assays or the master mix provided by Supplier AB. Inhibitors and concentrations were chosen to simulate potential contaminations carried over from conventional sample preparation methods. Threshold cycle value of each reaction was compared to that of a negative control where water was added to the PCR. Reported is the change in threshold cycle value, which is higher for reactions performed with the master mix from Supplier AB, demonstrating the protective capacity of the Multiplex PCR Master Mix.

Sensitive detection of microbial contaminants in food

To date, the predominant method to test food for the presence of pathogens has been via culture preparation and/or ELISA-based assays. Molecular-based methods, specifically real-time PCR, offer an informative complement to these well-established methods. In addition, real-time PCR detection delivers results in less time (Figure 5), affords greater sensitivity and specificity, and has the robustness to cope with difficult food matrices (Figure 6). Finally, real-time PCR is a safe method for detecting challenging pathogen strains.

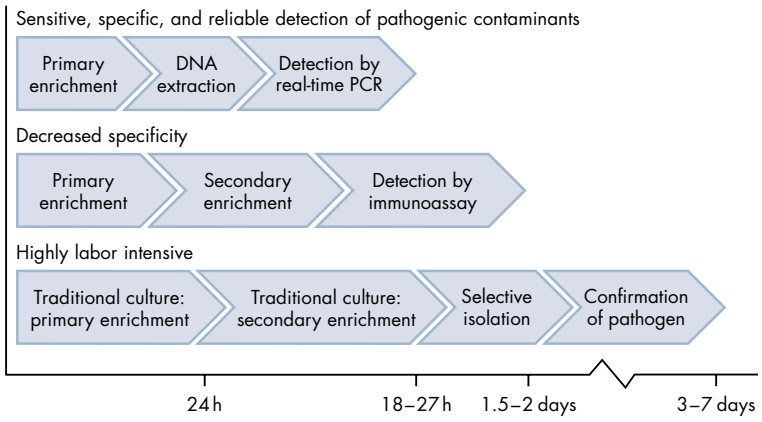


Figure 5. Comparison of time to result of different methods for pathogen detection. Delivering sensitive and highly specific results, real-time PCR analysis is also faster than conventional pathogen detection methods. Besides taking longer, immunoassays and traditional culture methods are less sensitive and more labor intensive.

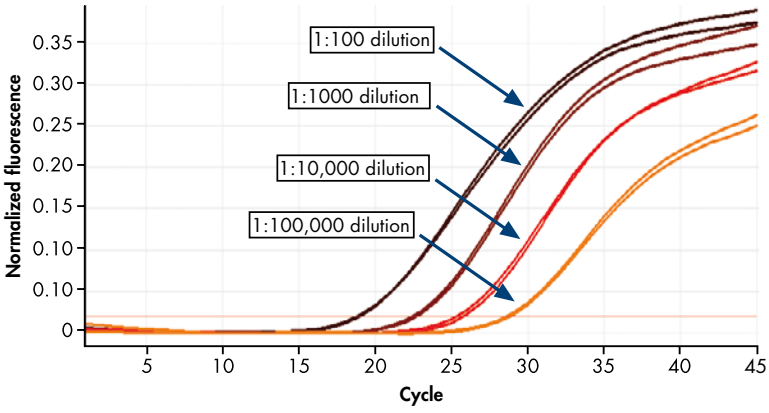


Figure 6. Highly sensitive pathogen detection, even in difficult food matrices such as peanut butter. Peanut butter was homogenized in buffered peptone water, spiked with < 5 cfu of *Salmonella*, and enriched for 20 h at 37°C. DNA was extracted from serially diluted samples of the enrichment culture using the *mericon* DNA Bacteria Kit and then tested with the *mericon* Salmonella Kit. Although the original inoculation was small, *Salmonella* was still reliably detected at a dilution factor of 1:100,000.

Real-time PCR: a sophisticated tool to maximize specificity

As pathogenicity may differ among species and even strains of a particular microbial contaminant, at times it is necessary to reliably detect a single pathogen species or strain. Because real-time PCR detection is based on the amplification of very specific DNA sequences, *mericon* PCR Assays have the level of specificity needed to accurately distinguish, for example, the highly pathogenic *Listeria monocytogenes* from among other common *Listeria* species, or specifically detect shigatoxin-secreting *Escherichia coli*.

Easy and reliable sample preparation

To provide a streamlined and straightforward method for microbial sample preparation from pathogen enrichment cultures, QIAGEN has designed protocols based on mechanical lysis (using beads) and thermal lysis (by boiling) that deliver optimal disruption force for different bacteria types. Thermal lysis is optimized for the majority of easily lysed Gram-negative bacteria (e.g., *Salmonella* spp., *Campylobacter* spp., and *Cronobacter* spp.), whereas the advanced features of mechanical sample preparation create the lysis conditions needed for difficult Gram-positive bacteria, such as *Listeria* spp. (Figure 7). Developed to be combined with *mericon* PCR Assays, both sample preparation systems deliver a DNA suspension that is optimal for real-time PCR analysis. Carefully formulated chemistry included in the *mericon* DNA Bacteria Kit and the *mericon* DNA Bacteria Plus Kit maximizes lysis efficiency, stabilizes the extracted DNA, and removes inhibitors that may interfere with downstream applications.

With the methods of these dedicated sample preparation kits, DNA extracted from even low-count samples is still suitable for sensitive real-time PCR. The flexibility of the method, using either mechanical or thermal lysis, accommodates a range of microbial species.

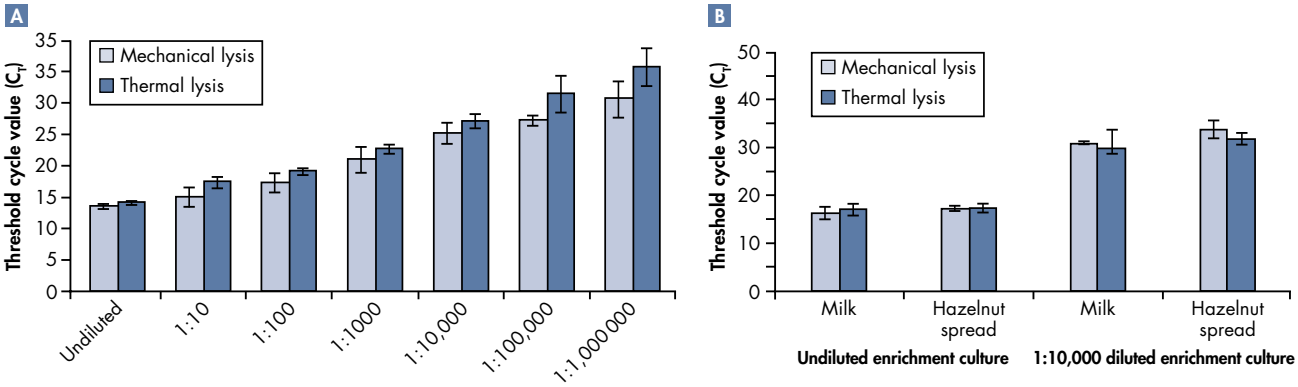


Figure 7. Efficient DNA extraction from Gram-negative or Gram-positive bacteria. A Samples of an enrichment culture of *Listeria monocytogenes* were diluted and subjected to the mechanical (bead) lysis protocol of the *mericon* DNA Bacteria Plus Kit and the thermal (boiling) lysis protocol of the *mericon* DNA Bacteria Kit to evaluate efficiency of lysis. For this Gram-positive bacterium, mechanical lysis delivered a more effective extraction, most evident at very low bacterial concentrations (highest dilution) where the average threshold cycle value was 4.9 cycles lower with mechanical lysis. B In a similar experiment, diluted and undiluted samples of an enrichment culture of *Salmonella enterica* in milk and hazelnut spread were subjected to the mechanical and thermal lysis protocols. Overall, the efficiency of DNA extraction from Gram-negative bacteria is similar with both preparation protocols.

Reliable identification of genetically modified organisms

Table 1. Results from cross-reactivity experiments for the *mericon* Screen Nos Kit and *mericon* Screen 35S Kit

Species	*mericon* Screen Nos Kit	*mericon* Screen 35S Kit
Bt11 corn	+	+
Bt176 corn	–	+
GA21 corn	+	–
CaMV	–	+
Barley	–	–
Wheat	–	–
Pig	–	–
Horse	–	–
CBH351 corn	+	+
LL T25 corn	–	+
Roundup Ready soy	+	+
LL canola	–	+
Potato	–	–
Rye	–	–
Sheep	–	–
NK603 corn	+	+
MON810 corn	–	+
Roundup Ready canola	–	–
Lambda DNA	–	–
Rice	–	–
Cattle	–	–
Goat	–	–

+: positive detection.
–: no detection signal.

Determining the presence of genetically modified organisms (GMO) in food entails detection of genetic constructs that are used to generate transgenic and cisgenic organisms. Real-time PCR is the method of choice to test food for the presence of matter originating from GMOs, since this technology specifically detects the presence of target DNA sequences. *mericon* PCR Assays feature primers and probes that target frequently used genetic constructs, such as the nos terminator and the 35S promoter. As a result, these tests deliver a decisive detection signal in the presence of widely used GMOs (Table 1). For the identification of a particular GMO, the *mericon* food testing portfolio includes a suite of tests that target DNA sequences unique to each of a wide range of GMOs, such as Roundup Ready soy, Bt11 corn, or MON810 corn. Detection with these kits is highly sensitive and specific.

One efficient sample preparation solution for all starting materials

The samples used to test for genetically modified organisms are often raw plant matter, seeds, and processed foods, which are challenging starting materials consisting of difficult food matrices. The extraction of sufficient and high-quality DNA is essential for reliable detection of GMOs and key to the sensitivity of any testing system. The DNeasy *mericon* Food Kit addresses this need by enabling efficient extraction of DNA from a broad range of heterogeneous starting materials using a streamlined, universal CTAB-based DNA preparation protocol (page 3). With fewer workflow steps than conventional CTAB protocols, up to 30 samples can be processed in 2.5 hours. DNA recovery with these kits is demonstrably high and efficient, even with DNA fragments down to 100 bp (Figure 8). The DNeasy *mericon* Food Kit complements *mericon* PCR Assays for detecting GMOs creating a streamlined workflow for efficient sample processing and reliable results.

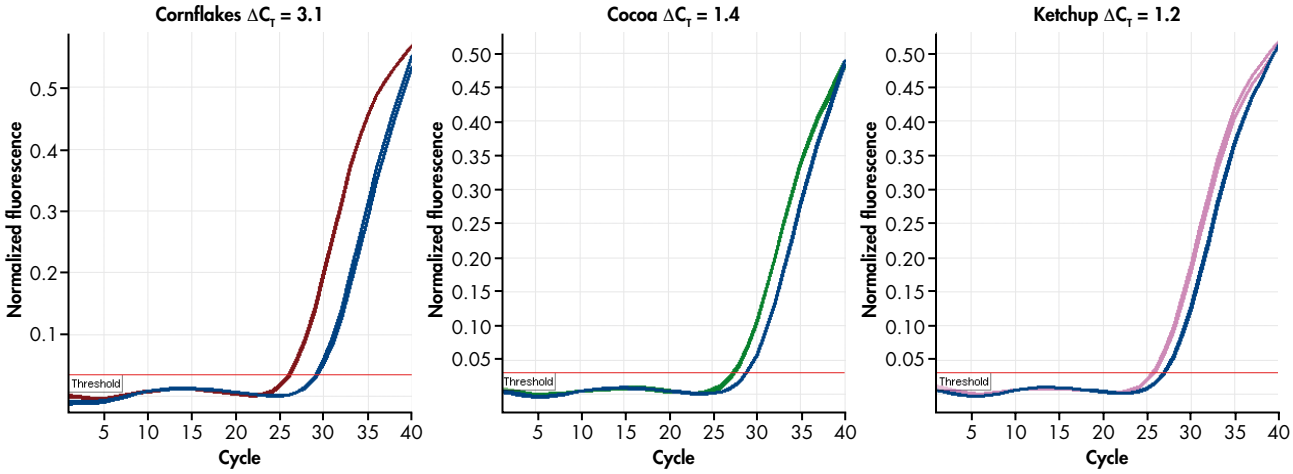


Figure 8. Enhanced DNA fragment recovery with optimized protocols. Samples of cornflakes and ketchup, strongly processed foods which consequently contain highly fragmented DNA, and cocoa, an inhibitor-rich food matrix, were processed using the standard protocol and the small fragment protocol of the DNeasy *mericon* Food Kit. To test the recovery capacity of these protocols, the samples were spiked with human DNA fragments 100 bp long prior to purification on spin columns. Human DNA fragments in the eluate were amplified using a probe-based PCR system specific for the added fragment. Binding conditions of the small fragment protocol significantly improved recovery in all three samples, resulting in threshold cycle values that were lower by up to 3.1 cycles (red, green, and pink curves) compared to the standard protocol (blue curves). This equates to approximately a 10-fold improvement in recovery of small fragments.

Eliminating cross-reactivity from allergen testing

Table 2. Assay specificity for walnut DNA

Species	Result
Walnut	+
Peanut	–
Hazelnut	–
Almond	–
Pistachio	–
Pine nut	–
Pecan	–
Macademia	–
Brazil nut	–
Pumpkin seed	–
Sunflower seed	–
Sesame seed	–
Plum	–
Apricot	–
Cherry	–
Canola	–
Corn	–
Lentil	–
Lupine	–
Soy	–
Rye	–
Sorghum	–
Pea	–
Buckwheat	–
Celery	–

+: positive detection.
–: no detection signal.

ELISA-based methods prevail in allergenic testing despite well-known conditions that lead to cross-reactivity (e.g., allergic cross-reactivity between almond and peanut). PCR-based methods are taking a stronghold in this area due to the superior specificity afforded by direct detection of allergen-specific DNA sequences. This heightened specificity practically eliminates concerns regarding testing cross-reactivity (Table 2). In addition, the sensitivity and specificity of allergen DNA detection by real-time PCR are independent of the ratio of allergen DNA to food DNA. This ratio often poses a problem for ELISA because allergens are typically present in trace amounts and thus, the immunological signal of a given allergen can be overwhelmed by cross-reactive molecules in the food matter. *mericon* PCR Assays detect allergen DNA when present in amounts as low as 10 copies per reaction. As a consequence, real-time PCR delivers highly specific detection of allergy-causing food fractions.

Evidence-supported validity of allergen DNA detection

Ultimately, the agent causing an allergic reaction is a protein. This raises the question whether basing allergen testing on molecular methods that screen for DNA is appropriate, especially when allergen quantification is a goal. There is ample evidence for a correlation between allergen quantification based on the direct detection of allergen protein versus the detection of allergen DNA (1).

Furthermore, detection of allergen DNA offers additional advantages:

- Detection of allergen DNA is more reliable then testing protein panels because not all allergenic proteins in food are known and are consequently not included in ELISA panels.
- DNA extraction is highly standardized and yields purified DNA, whereas protein extraction is typically not specific for target or food matrix.
- DNA is detectable even in highly processed foods, while proteins are easily denatured or react with components of the food matrix and therefore become undetectable.
- In contrast to ELISA, PCR enables differentiation of closely-related species (e.g., celery and other umbelliferous plants, or tree nuts).
- PCR assays include a number of process controls that enhance overall process safety.

mericon PCR Assays offer a highly standardized allergen testing method that enables true comparison of results across different food types, allergen types, and testing laboratories. One reason for this standardization is the binding specificity of the PCR primers and probes included in the kits. A second reason is the resistance of these assays to the effects of inhibitors present in food matrices. A third reason is that, unlike protein-based assays, DNA detection is not susceptible to molecular modification caused by food processing. This is in contrast to the variability in results from ELISA tests due to the nature of antibody design and the dependence of antibody binding on reaction conditions and protein configuration.

Coupled to the high performance of *mericon* PCR Assays is the efficient DNA extraction delivered by the DNeasy *mericon* Food Kit. Designed to cope with a spectrum of food types, this sample preparation kit enables high-quality DNA extraction from even highly processed foods where allergen DNA content is low (Figure 9).

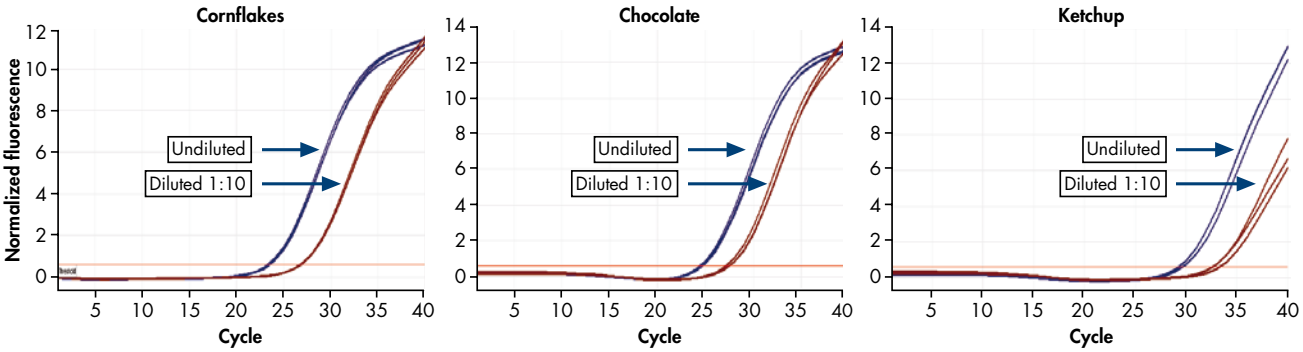


Figure 9. Efficient DNA preparation with the DNeasy *mericon* Food Kit. Examples of difficult food types were prepared for analysis using the DNeasy *mericon* Food Kit. Cornflakes and ketchup are highly processed foods that contain very fragmented DNA, and ketchup is additionally very acidic due to its vinegar content. Chocolate contains several strong PCR inhibitors. The amplification plots show successful detection of plant DNA by amplification of the chloroplast tRNA gene trnL. Each curve is a replicate of the sample preparation. Performed with pure DNA, this assay gives a positive shift in threshold cycle value (C_T) of 2.9–3.5 when a sample is diluted 1:10. The shift in threshold cycle value C_T between the undiluted and diluted samples fell in this range, demonstrating very efficient inhibitor removal during DNA preparation.

Detection that is robust to food processing

The identity of ingredients included in processed food, animal feed, and pharmaceutical products is of growing importance for food safety testing. Materials used in the production of food originate from an increasingly diverse and international list of suppliers and thus, ascertaining the identity of plant and animal matter included in a food ensures maintenance of standards that address food fraud (the use of low-quality matter in high-end foods), cultural specifications (e.g., Kosher and Halal food), and health risks associated with the consumption of undisclosed ingredients.

Table 3. Results from cross-reactivity experiments for the *mericon* Pig Kit

Species	Result
Pig	+
Wild boar	+
Chicken	–
Turkey	–
Sheep	–
Goat	–
Cattle	–
Goose	–
Horse	–
Deer	–
Ostrich	–
Kangaroo	–
Moose	–
Cod	–
Salmon	–
Duck	–
Reindeer (Caribou)	–

+: positive detection.
–: no detection signal.

Traditionally, assessment of the plant or animal origin of materials included in food has been performed with ELISA-based assays and protein profiling using two-dimensional pulsed-field gel electrophoresis (2D PFGE). Both methods detect the presence of proteins specific to a particular species of plant or animal and thus, are susceptible to protein configuration changes (denaturation) that result from food processing. Variability in protein structure decreases antibody binding and impacts molecule migration within a gel. Consequently, results with these methods are not always reliable. Furthermore, both methods are labor intensive and require optimization. In contrast, detection of DNA originating from particular animal or plant species by real-time PCR is not vulnerable to processing modifications and thus, offers a highly reliable and robust alternative testing method. The specificity of *mericon* PCR Assays is evident in the cross-reactivity results in Table 3. A positive detection signal is obtained for domestic pig and wild boar, but not for other animals tested.

Sensitivity to deal with challenging starting materials

Animal and plant matter are often used as subtle food additives. Due to small amounts and the often highly processed nature of the food containing the additive, detecting the presence of animal or plant matter can be difficult. Important to reliable detection in these samples is an extraction method that extracts DNA even from difficult food matrices (e.g., meat samples) and an assay with the sensitivity to detect even low levels of adulterant (Figure 10).

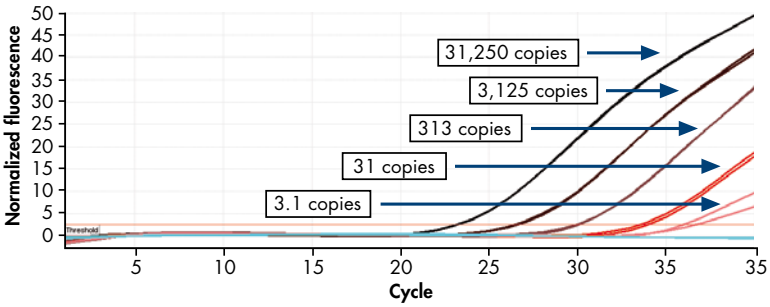


Figure 10. Reliable detection of trace amounts of pig. The *mericon* Pig Kit was used to test for pig DNA in a series of diluted samples from high to very low DNA content. High amounts of DNA do not interfere with the PCR and, conversely, the assay is sensitive enough to detect less than 10 copies of target DNA.

References:

1. Pederson, M.H., et al. (2008) Soybean allergen detection methods — a comparison study. Mol. Nutr. Food Res. **52**, 1486.

Products and expertise to meet your needs

QIAGEN's food testing portfolio is one of many versatile suites of products that QIAGEN brings to your benchtop to facilitate the fundamental work that leads to improvements in life. With this portfolio, we offer our expertise in sample and assay technologies by covering all segments of food safety testing — from pathogens to GMOs, allergens, and plant or animal identification — by streamlining sample preparation and detection protocols, by emphasizing modern methods and technologies, and by focusing on making all of the above accessible and easy to use.

Ordering Information

Product	Contents	Cat. no.
mericon Salmonella spp Kit (24)*	PCR Assay Salmonella spp, Positive Control DNA, QuantiTect® Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	290013
mericon L. monocytogenes Kit (24)*	PCR Assay L. monocytogenes, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	290023
mericon Campylobacter spp Kit (24)*	PCR Assay Campylobacter spp, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	290033
mericon Campylobacter triple Kit (24)*	PCR Assay Campylobacter triple, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	290043
mericon VTEC stx1/2 Kit (24)*	PCR Assay VTEC stx1/2, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	290053
mericon C. sakazakii Kit (24)*	PCR Assay C. sakazakii, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	290063
mericon S. aureus Kit (24)*	PCR Assay S. aureus, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	290073
mericon Legionella spp Kit (24)*	PCR Assay Legionella ssp, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	290083
mericon L. pneumophila Kit (24)*	PCR Assay L. pneumophila, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	290093
mericon Shigella spp Kit (24)*	PCR Assay Shigella spp, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	290103
mericon Y. enterocolitica Kit (24)*	PCR Assay Y. enterocolitica, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	290113
mericon Screen 35S Kit (24)*	PCR Assay Screen 35S, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	291013

* Larger kit sizes available; please inquire.

Ordering Information

Product	Contents	Cat. no.
mericon Screen Nos Kit (24)*	PCR Assay Screen Nos, Positive Control Screen DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	291043
mericon RR Soy Kit (24)*	PCR Assay RR Soy, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	291113
mericon Pig Kit (24)*	PCR Assay Pig, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	292013
mericon Soy Kit (24)*	PCR Assay Soy, Positive Control DNA, QuantiTect Nucleic Acid Dilution Buffer, RNase-Free Water, Multiplex PCR Master Mix, 50x ROX Dye Solution	293013
DNeasy *mericon* Food Kit (50)	50 QIAquick® Spin Columns, Proteinase K, buffers	69514
mericon DNA Bacteria Kit (100)	Fast Lysis Buffer	69525
mericon DNA Bacteria Plus Kit (50)	50 Pathogen Lysis Tubes L, Fast Lysis Buffer	69534

* Larger kit sizes available; please inquire.

For up-to-date licensing information and product-specific disclaimers, see the respective QIAGEN kit handbook or user manual. QIAGEN kit handbooks and user manuals are available at www.qiagen.com or can be requested from QIAGEN Technical Services or your local distributor.

Discover the *mericon* food testing portfolio and learn how real-time PCR can revolutionize your testing program! Visit www.qiagen.com/mericon-food-safety

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Finland ▪ Orders 0800-914416 ▪ Fax 0800-914415 ▪ Technical 0800-914413

France ▪ Orders 01-60-920-920 ▪ Fax 01-60-920-925 ▪ Technical 01-60-920-930

Germany ▪ Orders 02103-29-12000 ▪ Fax 02103-29-22000 ▪ Technical 02103-29-12400

Hong Kong ▪ Orders 800 933 965 ▪ Fax 800 930 439 ▪ Technical 800 930 425

Ireland ▪ Orders 1800 555 049 ▪ Fax 1800 555 048 ▪ Technical 1800 555 061

Italy ▪ Orders 800-789 544 ▪ Fax 02-334304-826 ▪ Technical 800-787980

Japan ▪ Telephone 03-6890-7300 ▪ Fax 03-5547-0818 ▪ Technical 03-6890-7300

Korea (South) ▪ Orders 080-000-7146 ▪ Fax 02-2626-5703 ▪ Technical 080-000-7145

Luxembourg ▪ Orders 8002-2076 ▪ Fax 8002-2073 ▪ Technical 8002-2067

Mexico ▪ Orders 01-800-7742-639 ▪ Fax 01-800-1122-330 ▪ Technical 01-800-7742-436

The Netherlands ▪ Orders 0800-0229592 ▪ Fax 0800-0229593 ▪ Technical 0800-0229602

Norway ▪ Orders 800-18859 ▪ Fax 800-18817 ▪ Technical 800-18712

Singapore ▪ Orders 1800-742-4362 ▪ Fax 65-6854-8184 ▪ Technical 1800-742-4368

Spain ▪ Orders 91-630-7050 ▪ Fax 91-630-5145 ▪ Technical 91-630-7050

Sweden ▪ Orders 020-790282 ▪ Fax 020-790582 ▪ Technical 020-798328

Switzerland ▪ Orders 055-254-22-11 ▪ Fax 055-254-22-13 ▪ Technical 055-254-22-12

UK ▪ Orders 01293-422-911 ▪ Fax 01293-422-922 ▪ Technical 01293-422-999

USA ▪ Orders 800-426-8157 ▪ Fax 800-718-2056 ▪ Technical 800-DNA-PREP (800-362-7737)

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