

TaqMan® GMO Detection and Quantitation System

- Universal assay detects and quantifies all approved GMOs in Europe and the vast majority of GMOs approved in other countries
- Fluorogenic 5' nuclease assay using TaqMan® probes provides accurate and reproducible quantitative results
- Comprehensive controls provide high confidence in results
- Innovative GMO quantitation software allows users to quickly and easily determine the percentage of GMO content
- Label license conveys the PCR service rights for genetically modified organism (GMO) testing when used in conjunction with an Authorized Thermal Cycler, so no additional royalties are due
- Offers the complete solution including sample preparation, instruments, reagents, analysis software, technical support, instrument service, and GMO expertise

Unmatched Standard for GMO Quantitation

The TaqMan® GMO Detection and Quantitation System is a complete solution for GMO detection and quantitation in seed, grain, and processed foods and their ingredients. This easy-to-use system includes DNA sample preparation, automated PCR amplification and signal detection, data analysis, and GMO quantitation software, which eliminates the need for personnel trained in molecular techniques. The system uses the

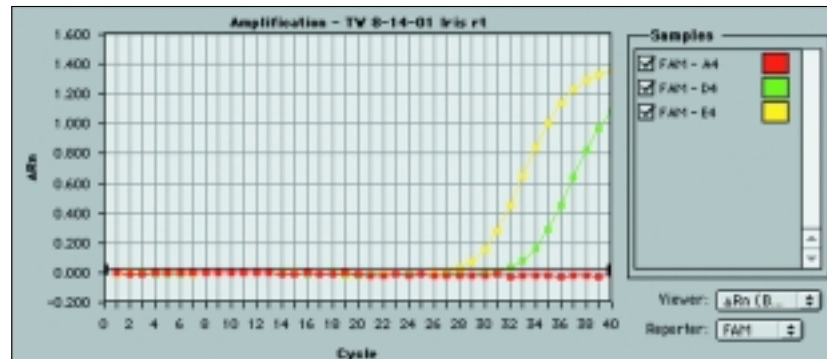


Figure 1. Amplification plot of processed foods purchased from a local supermarket and tested with the TaqMan GMO Soy 35S Detection Kit run on an ABI PRISM® 7700 system.

A) Soy-based infant formula, 50% GMO content (yellow)

B) Energy bar, 8% GMO content (green)

C) Soy-based drink, GMO-negative (red)

GMO content was calculated using GMO soy reference standards. DNA template was prepared from the food samples using PrepMan™ Ultra reagent.

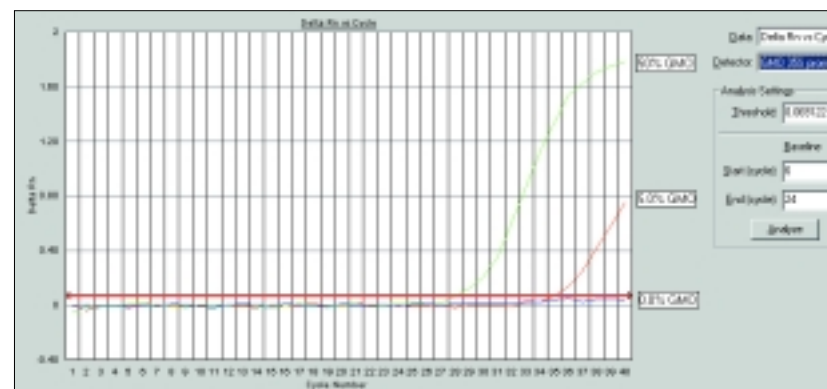


Figure 2. Amplification plot of processed foods purchased from a local supermarket and tested with the TaqMan GMO Maize 35S Detection Kit run on an ABI PRISM® 7000 system.

A) Puppy food, 50% GMO content (green)

B) Corn snack, 5% GMO content (red)

C) Blue corn chips, GMO-negative (blue)

GMO content was calculated using GMO maize reference standards (RTC, Laramie WY). DNA template was prepared from the food samples using PrepMan Ultra reagent.

patented fluorogenic 5' nuclease method for multiplex detection and quantitation, the latest innovation in real-time PCR technology. The TaqMan GMO Detection and Quantitation System is the latest

addition to the TaqMan food pathogen product line for the detection of *Salmonella*, *E. coli* O157:H7, and STX1- and STX2-containing food-borne pathogens.

Reproducible Detection and Quantitation Method

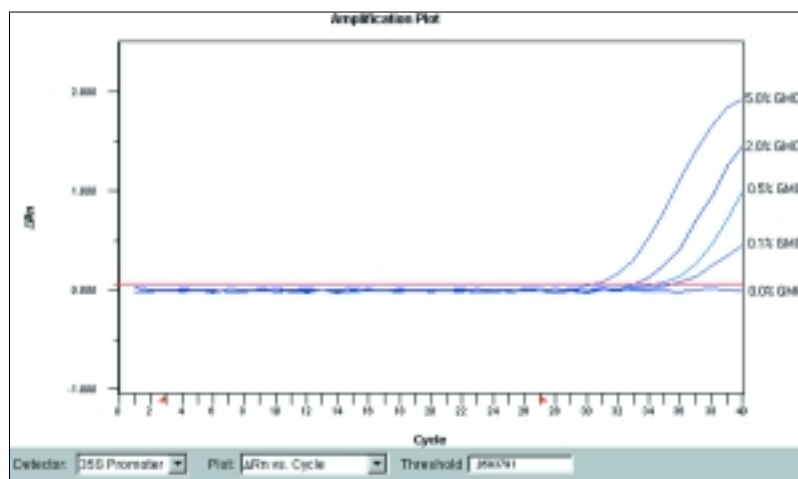
The TaqMan GMO 35S Detection kits detect the presence of GMO-specific DNA sequences in all types of processed foods and food ingredients. Since DNA is present in all tissues, there is no dependence on the type of plant tissue assayed or any impact from protein degradation during sample preparation.

The Cauliflower Mosaic Virus 35S promoter, which is the GMO-specific sequence detected, is present in all GMO soy and maize events approved in the European Union, and the vast majority of the GMO events approved in other countries.

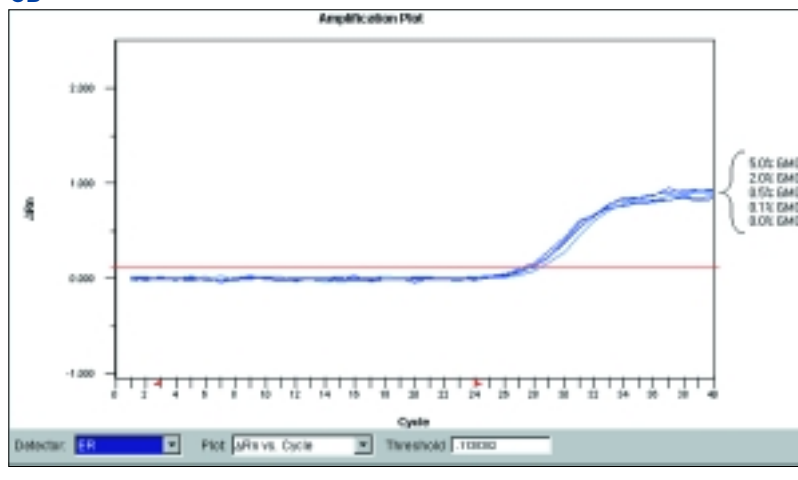
Accurate Results

The fluorogenic 5' nuclease method employs a TaqMan probe that is labeled with a fluorescent reporter dye. This probe hybridizes to the GMO target sequence between the forward and reverse PCR primers, providing increased specificity. During amplification, the AmpliTaq Gold[®] DNA Polymerase cleaves the TaqMan probe, resulting in a cycle-by-cycle increase in reporter fluorescence. Real-time detection allows the calculation of the initial amount of GMO target during the exponential phase of the PCR where none of the components are limiting, thus producing more accurate and reproducible results. The European Union and Japan view this method as the premier technology for quantitation of GMO content in foods. In contrast, the PCR melting curve or end-point analysis method produces a variable fluorescent signal after the final amplification cycle, providing a significant degree of error in the quantitation of GMO content.

3A



3B



Figures 3A and 3B. Amplification plots of GMO maize reference standards (Sigma-Aldrich).

3A) CaMV 35S assay (GMO-specific target), FAM[™] dye layer for 0.0% GMO maize, 0.1% GMO maize, 0.5% GMO maize, 2.0% GMO maize, and 5.0% GMO maize run on an ABI PRISM[®] 7900HT system.

3B) Zein assay (maize-specific endogenous reference target), VIC[™] dye layer for 0.0% GMO maize, 0.1% GMO maize, 0.5% GMO maize, 2.0% GMO maize, and 5.0% GMO maize.

These data illustrate that the detection of the GMO-specific target varies with the amount of GMO maize flour present in each sample (Figure 3A). The greater the percentage of GMO flour in the sample, the lower the C_T value. However, since all the samples are pure maize flour, the amount of total maize in each sample is the same, so the detection of the plant-specific ER target and its corresponding C_T value is the same for all samples (Figure 3B).

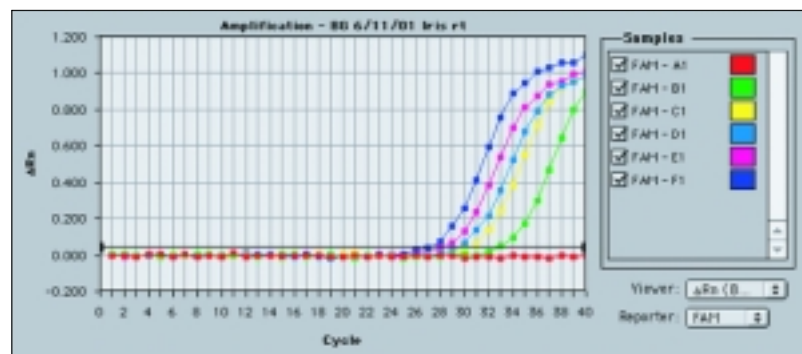
Comprehensive Controls for Complete Confidence

In addition to the detection of the GMO-specific target, the TaqMan GMO system employs a multiplex assay to detect and quantitate the presence of a maize- or soy-specific endogenous reference (ER) target in the same sample well as the

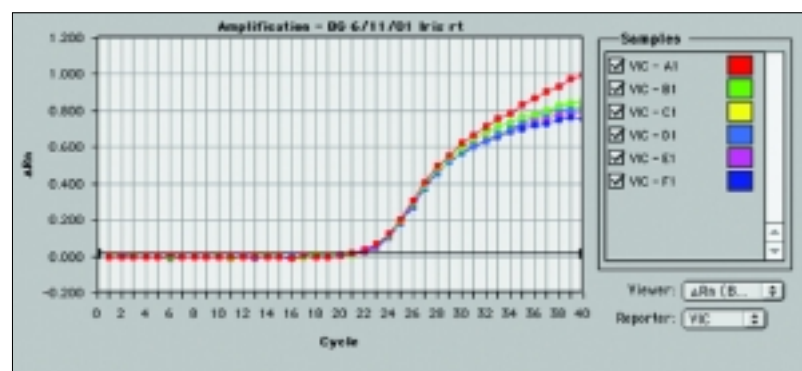
GMO-specific target. The amplification of this ER target serves two purposes:

1. The amount of GMO maize or GMO soy as a percent of the total maize or soy in any given food is the basis for GMO labeling regulations enacted in the European Union and Japan (with similar regulations considered by many other countries).

4A



4B



Figures 4A and 4B. Amplification plots of GMO soy reference standards (RTC, Laramie, WY).

4A) CaMV 35S assay (GMO-specific target), FAM™ dye layer for 0% GMO soy (red), 0.1% GMO soy (green), 0.2% GMO soy (yellow), 0.5% GMO soy (light blue), 1.0% GMO soy (purple), and 5.0% GMO soy (dark blue) run on an ABI PRISM 7700 system.

4B) Lectin assay (soy-specific endogenous reference target), VIC™ dye layer for 0% GMO soy (red), 0.1% GMO soy (green), 0.2% GMO soy (yellow), 0.5% GMO soy (light blue), 1.0% GMO soy (purple), and 5.0% GMO soy (dark blue).

These data illustrate that the detection of the GMO-specific target varies with the amount of GMO soy flour present in each sample (Figure 4A). The greater the percentage of GMO flour in the sample, the lower the C_T value. However, since all the samples are pure soy flour, the amount of total soy in each sample is the same, so the detection of the plant-specific ER target and its corresponding C_T value is the same for all samples (Figure 4B).

The ER target provides a means for determining the total amount of maize or soy in the sample. Including appropriate GMO standards permits accurate determination of the percent of GMO content in each sample.

2. The absence of a signal from the ER target, indicating the presence of PCR inhibitors in the sample, signifies a false negative result.

A passive reference (ROX™ dye) is included in the TaqMan GMO master mix to serve as a normalization

standard, so even common pipetting errors will not affect the quantitation of GMO content. Once the DNA samples and reagents are added to the specially designed plates and caps, the sample wells are sealed and remain sealed throughout the amplification and detection process, greatly reducing the chances of carryover contamination.

Rapid Results

The TaqMan GMO system can provide results in as little as 3 hours. Template DNA can be prepared from

processed foods or their ingredients in less than 30 minutes using PrepMan™ Ultra Sample Preparation Reagent. The total run time for 96 sample wells on either the ABI PRISM® 7000 or the 7700 Sequence Detection System is just 2.5 hours. Using the ABI PRISM® Detector Software with the GMO quantitation software module, the percent of GMO content can be determined in just 5 minutes. The total time-to-result is just 3 hours. Two runs of 96 sample wells each can be completed in a standard working day, with a third run continuing overnight, totaling 288 sample wells per day. For greater throughput, 384 sample wells can be processed on the ABI PRISM® 7900HT Sequence Detection System totaling 1,152 sample wells per day. The ABI PRISM 7900HT Sequence Detection System with automation can run completely unattended, processing 3,456 sample wells every 24 hours.

PCR Service Rights

The TaqMan GMO kits from Applied Biosystems can be used to detect and quantitate GMO content in processed foods using real-time PCR amplification. These kits carry a PCR label license granting GMO testing service rights* and require no additional royalty payments with respect to performing these commercial services**.

* When used in conjunction with an Authorized Thermal Cycler.

**Other licenses may be required for your specific application.

The Whole Product Solution

Applied Biosystems has combined state-of-the-art instruments, reagents, software, and GMO expertise to provide your laboratory with the most advanced, comprehensive system available for accurate GMO detection and quantitation. All of our products

undergo rigorous quality testing under ISO 9001 guidelines to ensure that they meet our performance specifications. The system is supported by our extensive worldwide technical

support, service, and training organization. For more information, please contact your Applied Biosystems sales representative or your local sales office.

Ordering Information

Description	P/N
TaqMan GMO Maize 35S Detection Kit, 100 assays Includes AmpliTaq Gold® DNA Polymerase, positive and negative controls, Quick Start Card, and Protocol	4327693
TaqMan GMO Soy 35S Detection Kit, 100 assays Includes AmpliTaq Gold® DNA Polymerase, positive and negative controls, Quick Start Card, and Protocol	4327692
PrepMan Ultra Sample Preparation Reagent, 100 preparations Includes Quick Start Card and Protocol	4322547
PrepMan Ultra Sample Preparation Reagent, 100 preparations	4318930
TaqMan <i>Salmonella</i> Gold Detection Kit, 100 assays Includes AmpliTaq Gold® DNA Polymerase, positive and negative controls, Quick Start Card, and Protocol	4330675
TaqMan® <i>E. coli</i> O157:H7 Detection Kit, 100 assays Includes AmpliTaq Gold® DNA Polymerase, positive and negative controls, Quick Start Card, and Protocol	4307514
TaqMan <i>E. coli</i> STX1 and STX2 Detection Kit, 100 assays each Includes AmpliTaq Gold® DNA Polymerase, positive and negative controls, Quick Start Card, and Protocol	4309083

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