

What's in your food? Analyzing food integrity using the Maxwell® RSC PureFood GMO and Authentication kit.

Brad A. Hook, Samantha R. Lewis, Trista Schagat

Promega Corporation, 2800 Woods Hollow Rd, Madison, WI, 53711



1. Introduction

Consumers around the world are increasingly demanding information on and reassurance of the origin and content of their food. These increased demands come amid legislative and regulatory pushes that increase the complexity and level of regulation imposed on the food supply worldwide. Protecting consumer rights and preventing fraudulent or deceptive practices such as food adulteration are important and challenging issues facing the food industry.

Molecular tests, and in particular real-time PCR-based assays, continue to gain more widespread use in food safety testing. PCR-based assays are significantly faster and more reliable than traditional methods and also can detect more specific genetic targets. We used the Maxwell® RSC PureFood GMO and Authentication Kit to efficiently purify DNA from food.

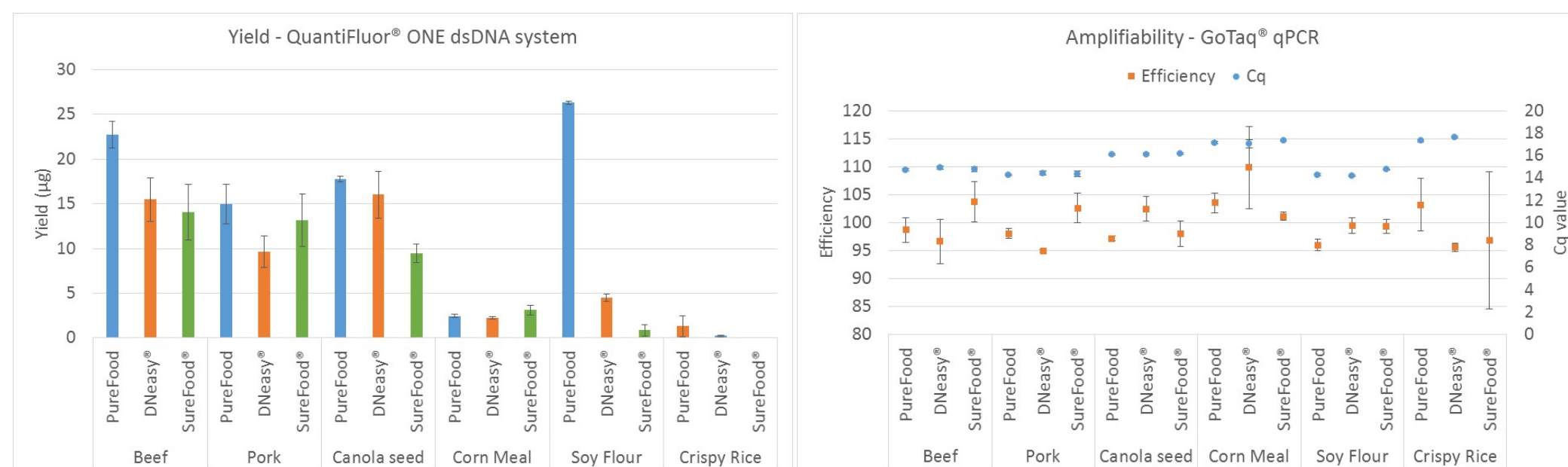


2. The Maxwell® RSC PureFood kit versus competitors

We analyzed the DNA extracted from three extraction kits for yield, purity, and amplifiability.

Kits: Maxwell® RSC PureFood, Qiagen DNeasy® mericon® Food, r-Biopharm SureFood®.

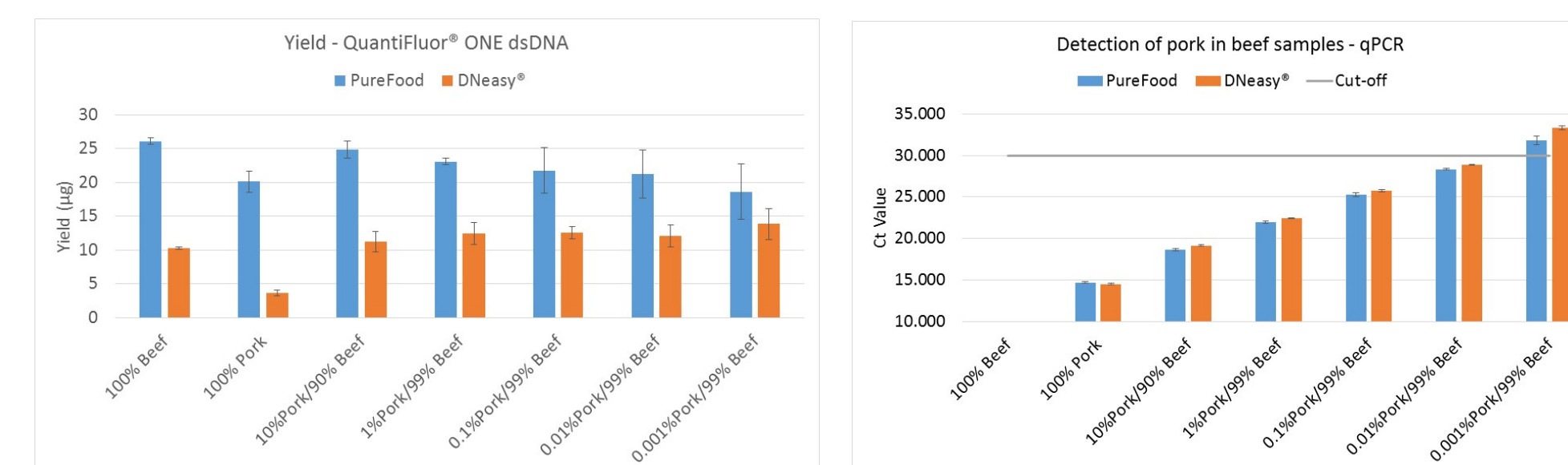
Food: ground beef, pork sausage, canola seed, corn meal, soy flour, crispy rice cereal



For all 6 food samples, the PureFood out-performed the competitor products in yield. The DNA purity, as determined by NanoDrop absorbance ratios, showed the PureFood was as good or better than the competitors. All DNA was amplifiable using the GoTaq® qPCR system with either meat or plant universal primers and showed no PCR inhibition at 0.5-50ng of DNA (i.e. PCR efficiency > 90%).

3. Meat Authentication

Ground beef was spiked with pork sausage at 10, 1, 0.1, 0.01 and 0.001% (w/w). DNA was extracted using the Maxwell® RSC PureFood GMO and Authentication Kit and the DNeasy® mericon® Food Kit from 2g samples. DNA eluates were amplified using the RapidFinder™ Pork ID kit to identify swine DNA.

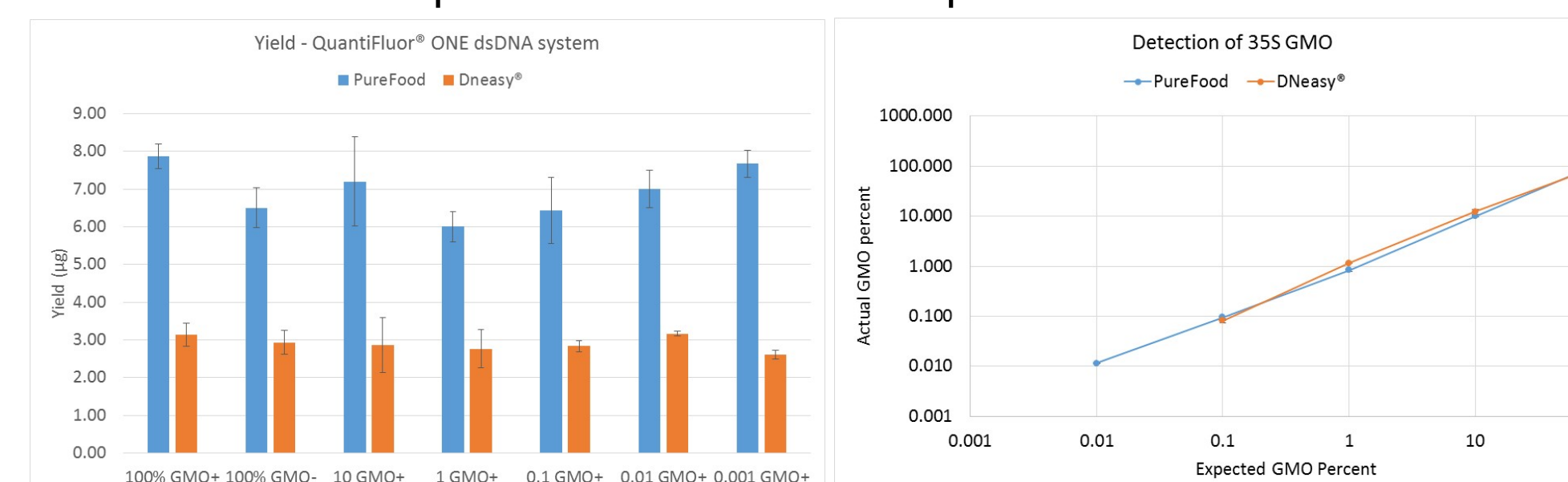


Both isolation methods extracted DNA from the meat samples; however the PureFood kit had twice the yield of the DNeasy® mericon® kit. DNA was amplifiable with the swine specific kit from all samples except the 100% beef sample. Based on the Ct cut-off from positive control, swine DNA was identified down to 0.01% Pork sample.

4. GMO testing of maize kernels



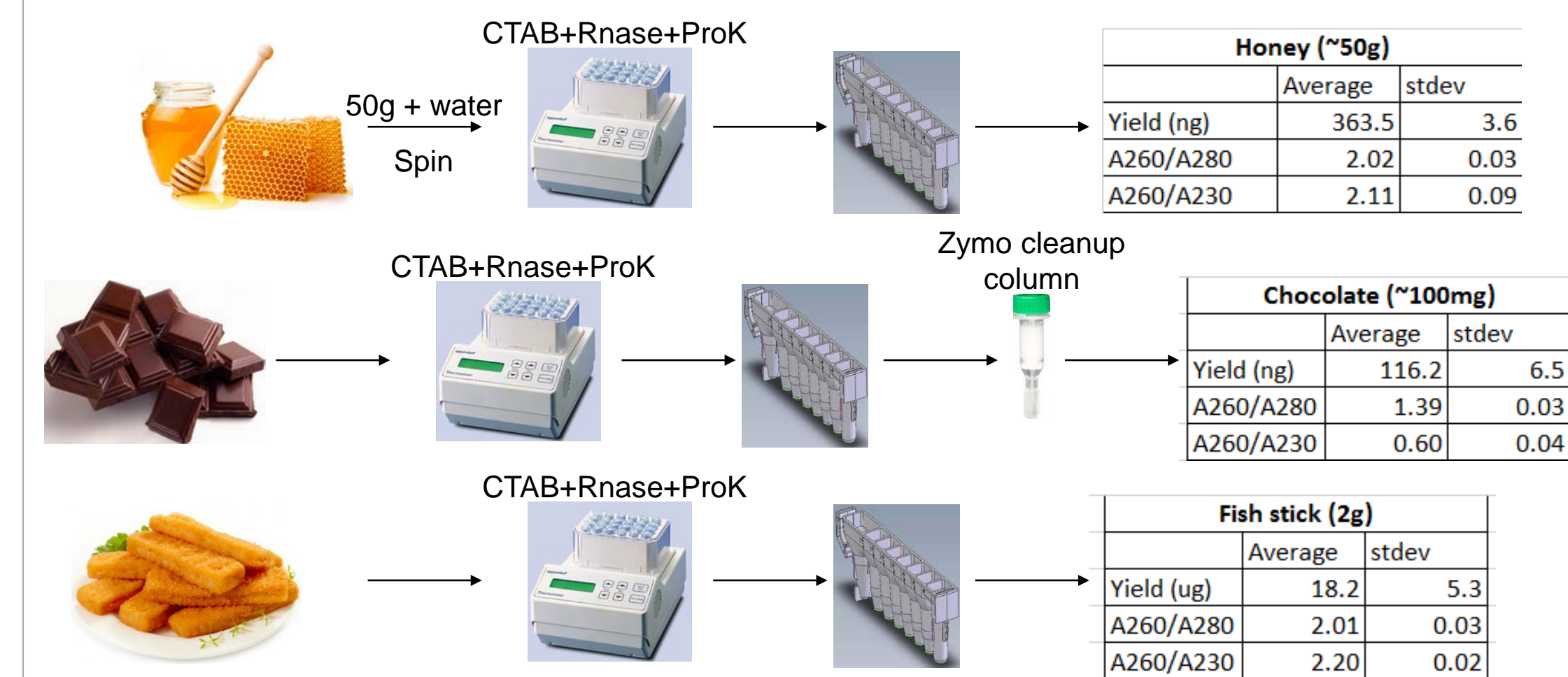
GMO positive, ground maize was spiked into GMO free maize at 10, 1, 0.1, 0.01, and 0.001% (w/w). DNA was extracted using the Maxwell® RSC PureFood GMO and Authentication Kit and the DNeasy® mericon® Food Kit from 2g samples. DNA eluates were amplified using the TaqMan® GMO Maize 35S detection kit to identify the percent GMO in the samples.



Both isolation methods extracted DNA from the 2 g maize samples; however the PureFood kit had twice the yield of the DNeasy® mericon® kit. The 35S GMO event was detected down to 0.01% in the PureFood samples, but only 0.1% in the DNeasy® mericon® samples.

5. Isolation of DNA from processed foods

Many processed food and feed products are non-optimal sources of DNA as food processing procedures can result in DNA fragments $\leq 200-1,000\text{bp}$. In some complex food products (e.g., sausages or chocolate), DNA may be embedded in substances that inhibit PCR reactions. Overall, complex and more products tend to yield poor quality DNA. DNA from honey, chocolate and fish sticks were successfully extracted and amplified using the Maxwell® RSC PureFood GMO and Authentication Kit.



6. Conclusions

The Maxwell® RSC PureFood GMO and Authentication kit:

- Performs as well or better than Qiagen DNeasy® mericon® Food kit and r-Biopharm SureFood® kits when comparing DNA yield, purity and amplifiability.
- Requires significantly less time and hands on time as compared to the Qiagen DNeasy® mericon® Food kit and r-Biopharm SureFood® kits.

	Processing step	number of total spins	Total time (min)	Hands on time (min)
PureFood	6	1	100	30
DNeasy mericon	12	6	120	90
SureFood	20	12	150	120

- Extracts DNA which can be used to detect 0.01% 35S GMO event in maize.
- Extracts DNA which can be used to detect 0.01% pork in beef samples.
- Extracts DNA from processed foods such as honey, fish sticks and chocolate.