

Confident Quantitation

Any compound, any matrix, any user.

ThermoFisher
S C I E N T I F I C

New Innovative Triple Quadrupole MS Technologies for Unstoppable Performance and Confident Quantitation of Pesticide Residues in Foods

Richard Fussell



Introduction to Thermo Scientific™ TSQ Altis™ and TSQ Quantis™

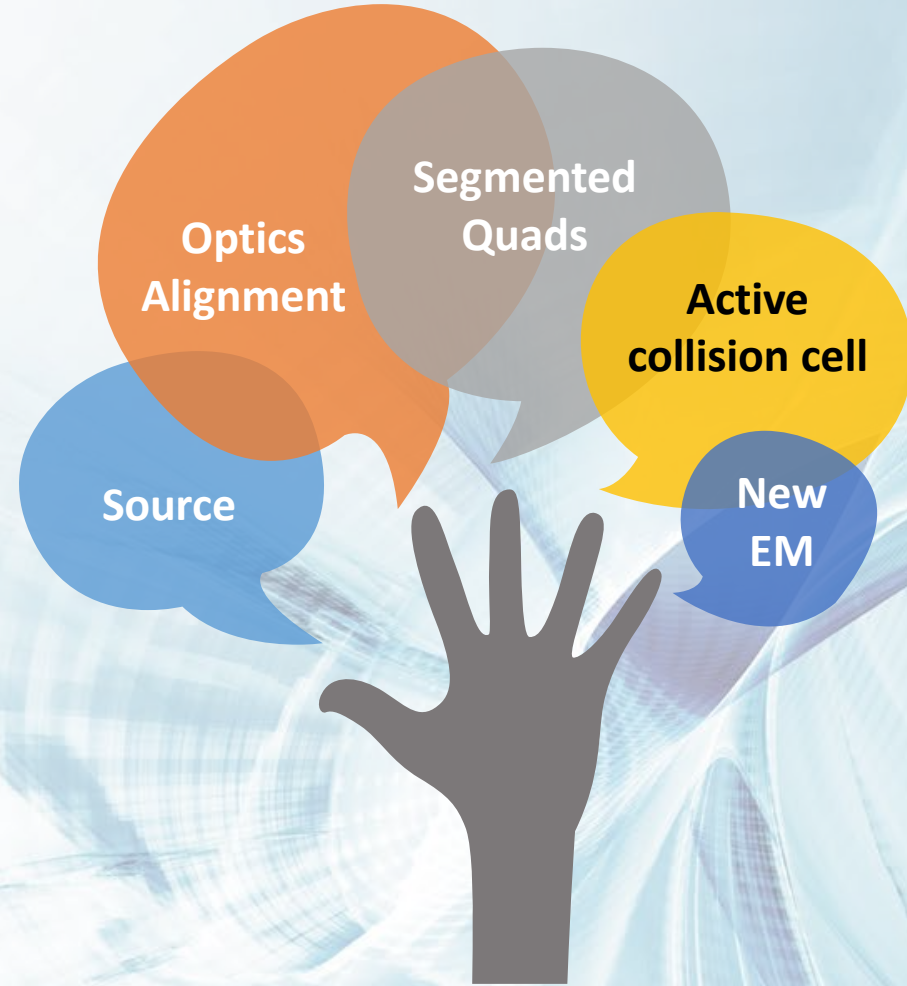
Performance: Sensitivity, Selectivity (H-SRM)



600 SRM/sec
Selectivity (H-SRM)-0.2 Da FWHM



600 SRM/sec
Selectivity (H-SRM)-0.4 Da FWHM



Selective high-resolution SRM, Robustness, Reproducibility, Speed, Ease-of-Use, Flexibility

TSQ Quantis™: Unprecedented Robustness, Day After Day



Active Ion Management Plus (AIM+) - The next step in precision design delivers the ultimate in ion management, inception to detection, from the OptaMax™ ion source housing to the enhanced electron multiplier. Incorporates segmented quadrupoles with hyperbolic surfaces and enhanced RF Electronics to further optimize ion management precision, reliability, speed, and reproducibility.

Enhanced dual-mode electron multiplier detector
ensures excellent linearity and dynamic range

Stacked ring ion guide (SRIG)
Increases ion flux

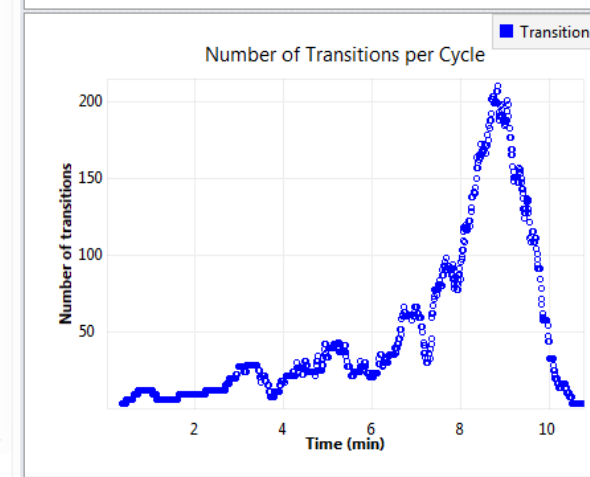
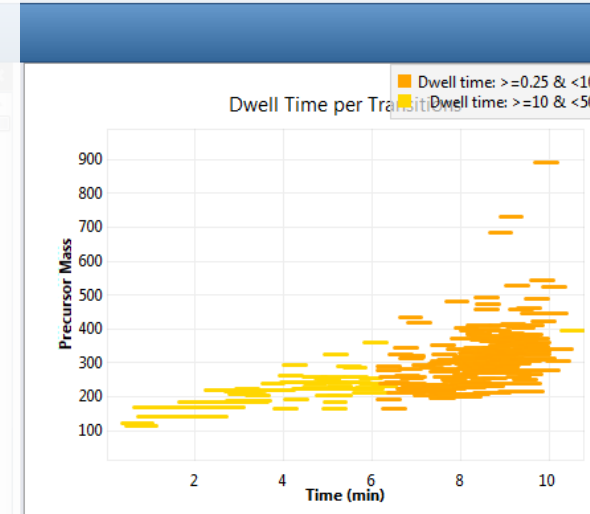
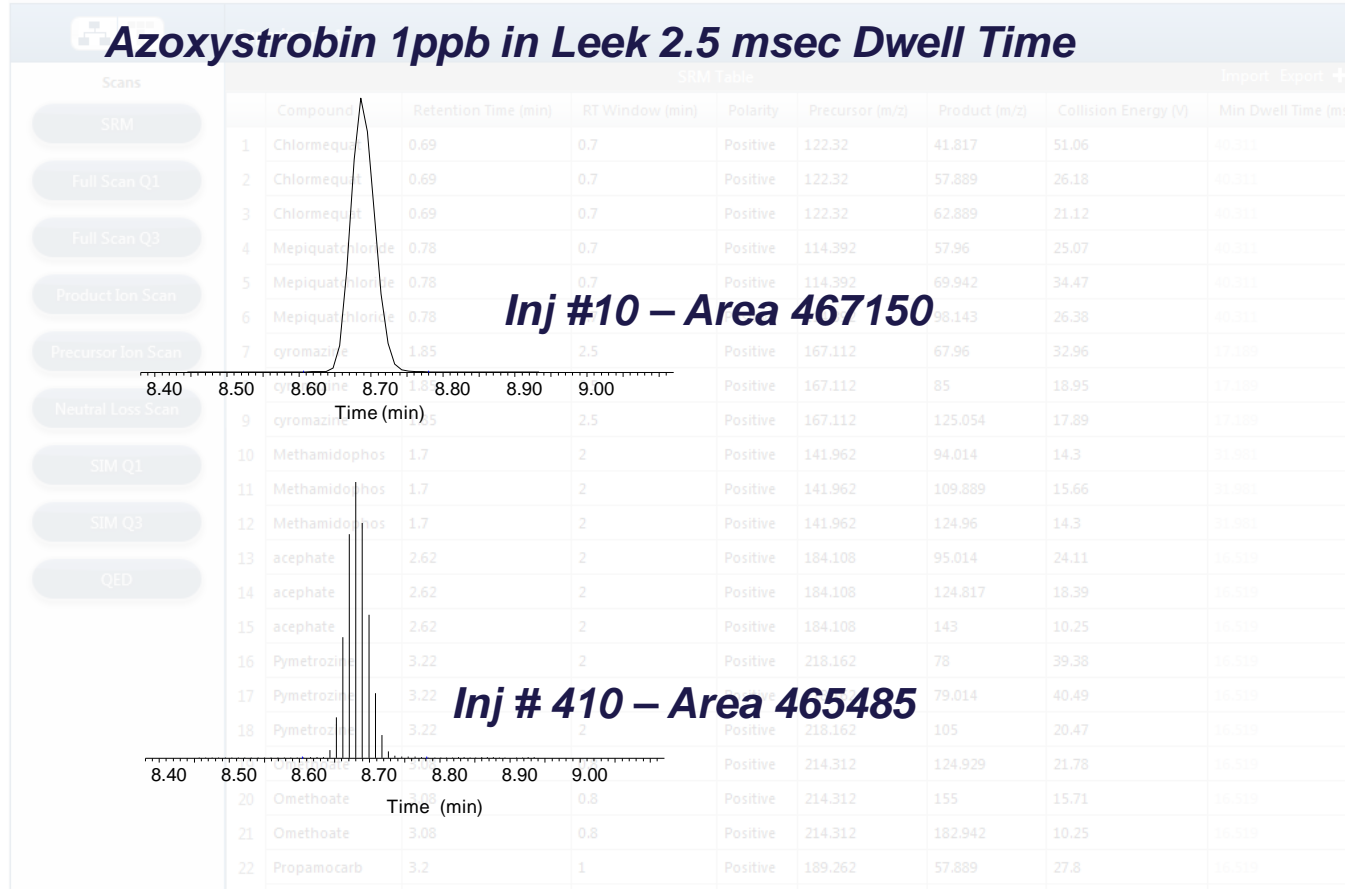
Segmented Quadrupoles
with hyperbolic surfaces for enhanced performance with both SRM and H-SRM (0.4 FWHM)

OptaMax™ NG
APCI ready

Ion beam guide with neutral blocker
Reduces chemical background

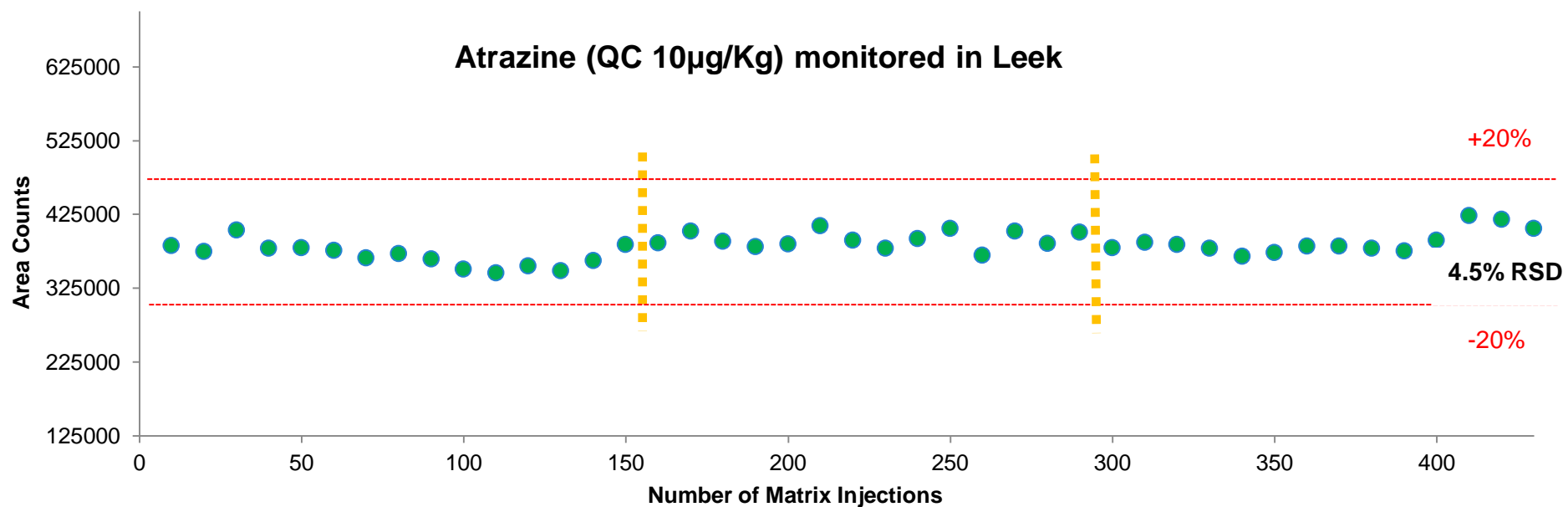
Active collision cell with axial DC field
facilitates more SRMs/sec

Benefits: More compounds in the same run or longer dwells on existing method

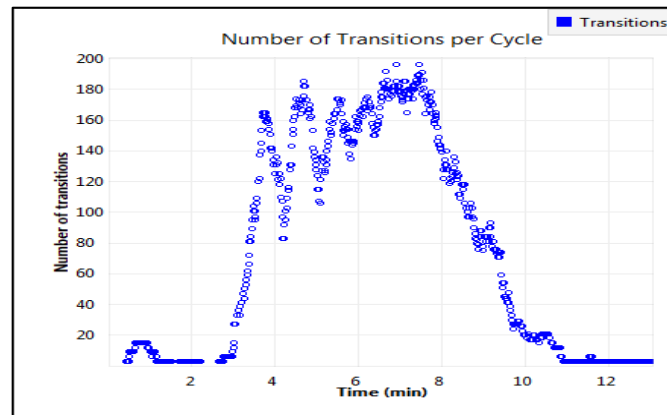
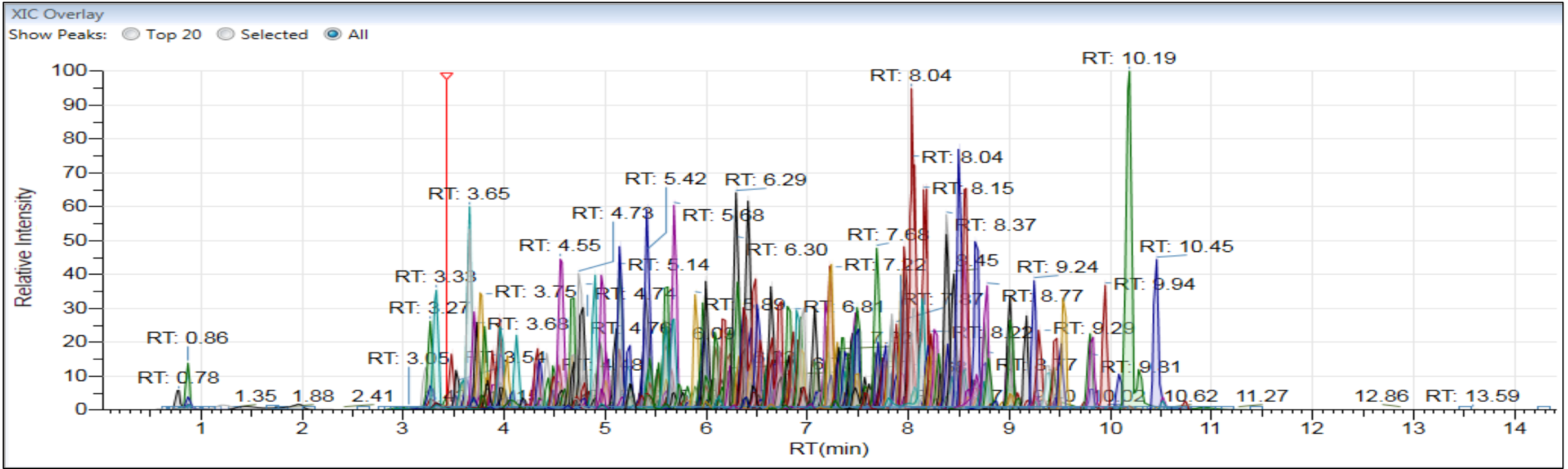


~ 160 Transitions Monitored Simultaneously with Polarity Switching. Excellent Reproducibility (% RSD 2.3)

Atrazine QC monitored in leek for more than 400 injections with 4.5% RSD. at 10 µg/Kg. Yellow lines show the time the system was placed in standby mode for 12h to demonstrate consistent performance after standby period



New Gradient Method

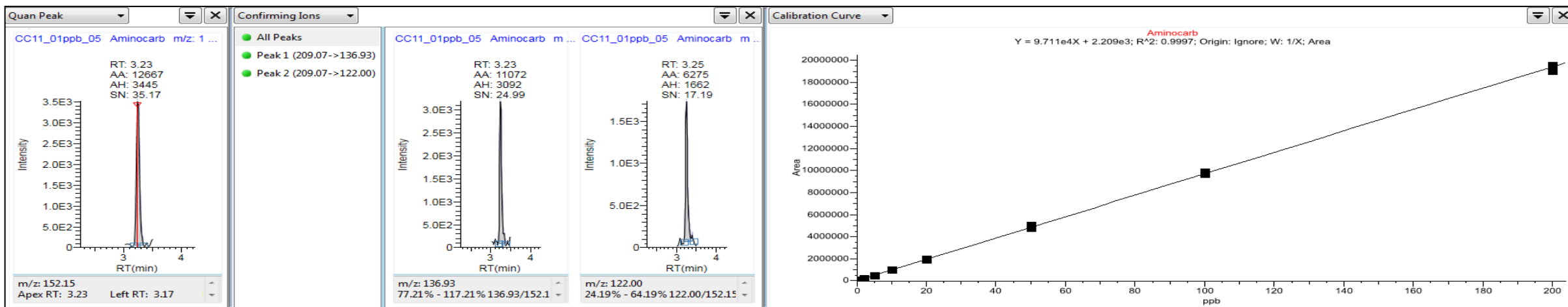


1918 SRMs Min dwell time = 3.4 msec

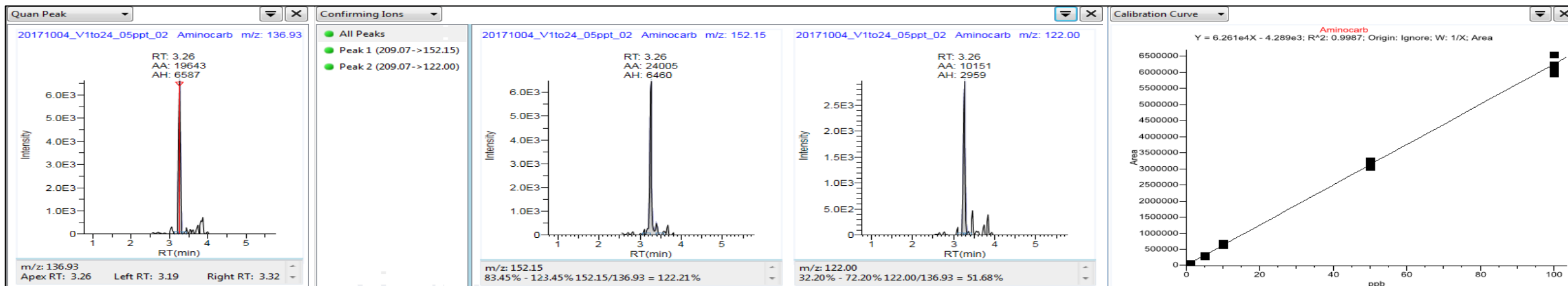
More details see Poster PV 021

Aminocarb at 0.1 ng/g

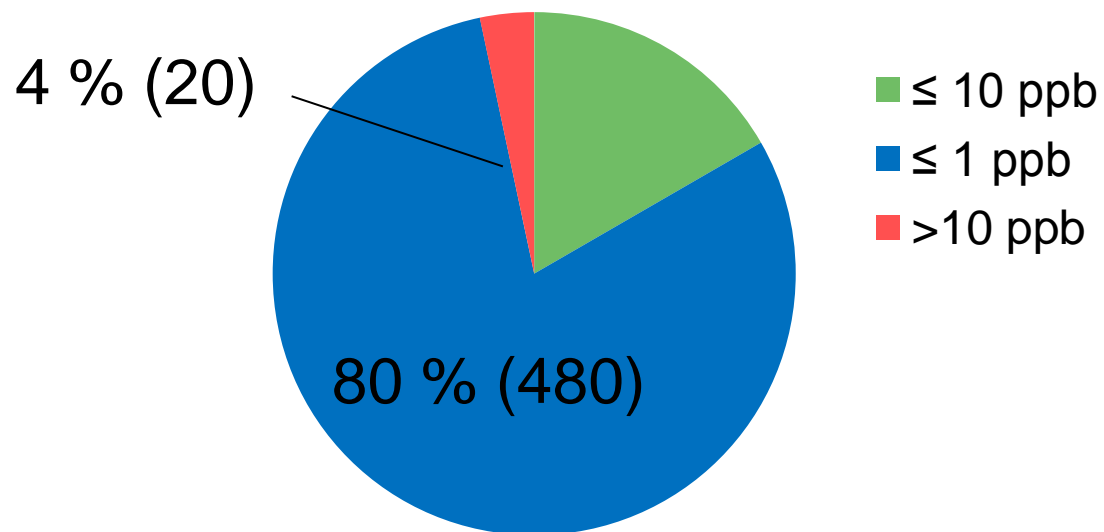
In solvent



In matrix



~600 pesticides in solvent



Data from Customer-Shanghai



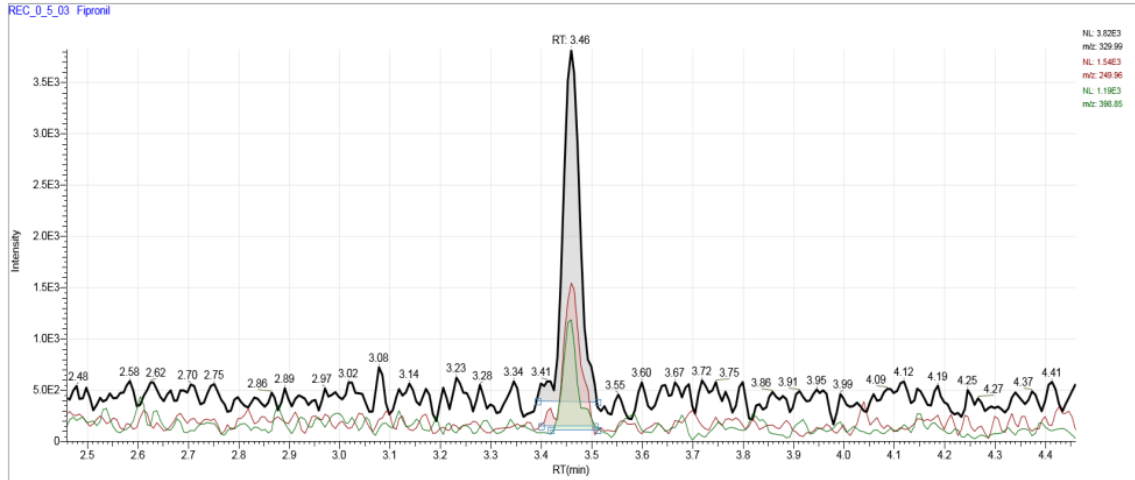
- Targeting 200+ pesticides
- QuEChERS extraction
- Continuous 24/7 operation

- LOQ = 1 ng/g for 90% compounds

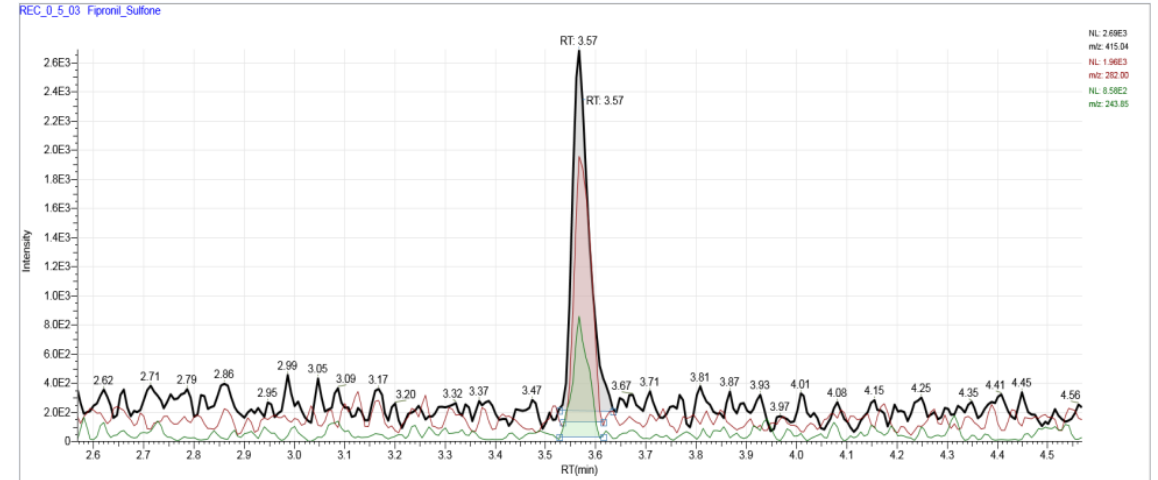
- RSD < 5% for 80% of pesticides
- < 10% for 90%
- < 20% for 96%

Excellent Performance In The Negative Ion Mode - Ion Overlays- Fipronil In Eggs

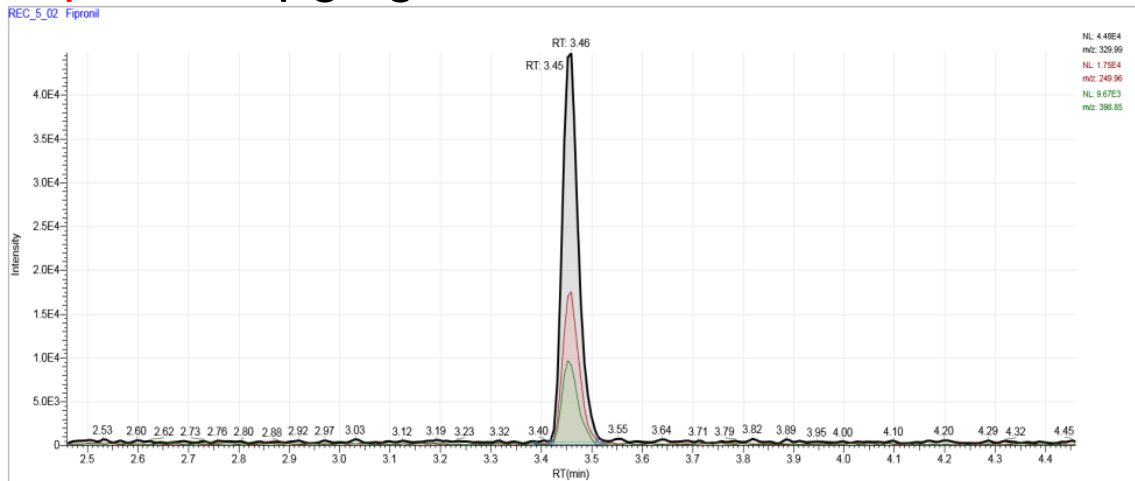
Fipronil: 0.5 µg/kg



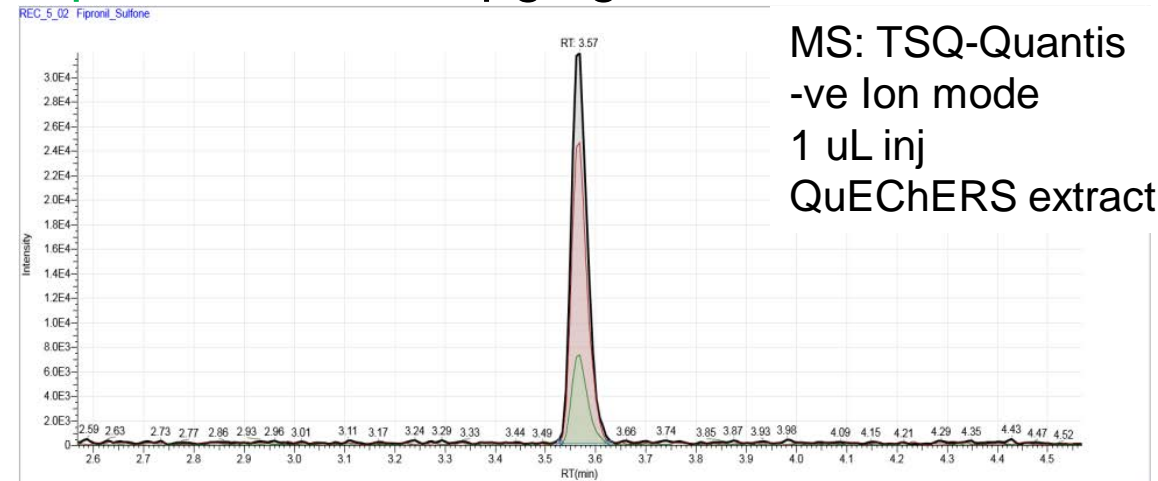
Fipronil sulfone: 0.5 µg/kg



Fipronil: 5 µg/kg

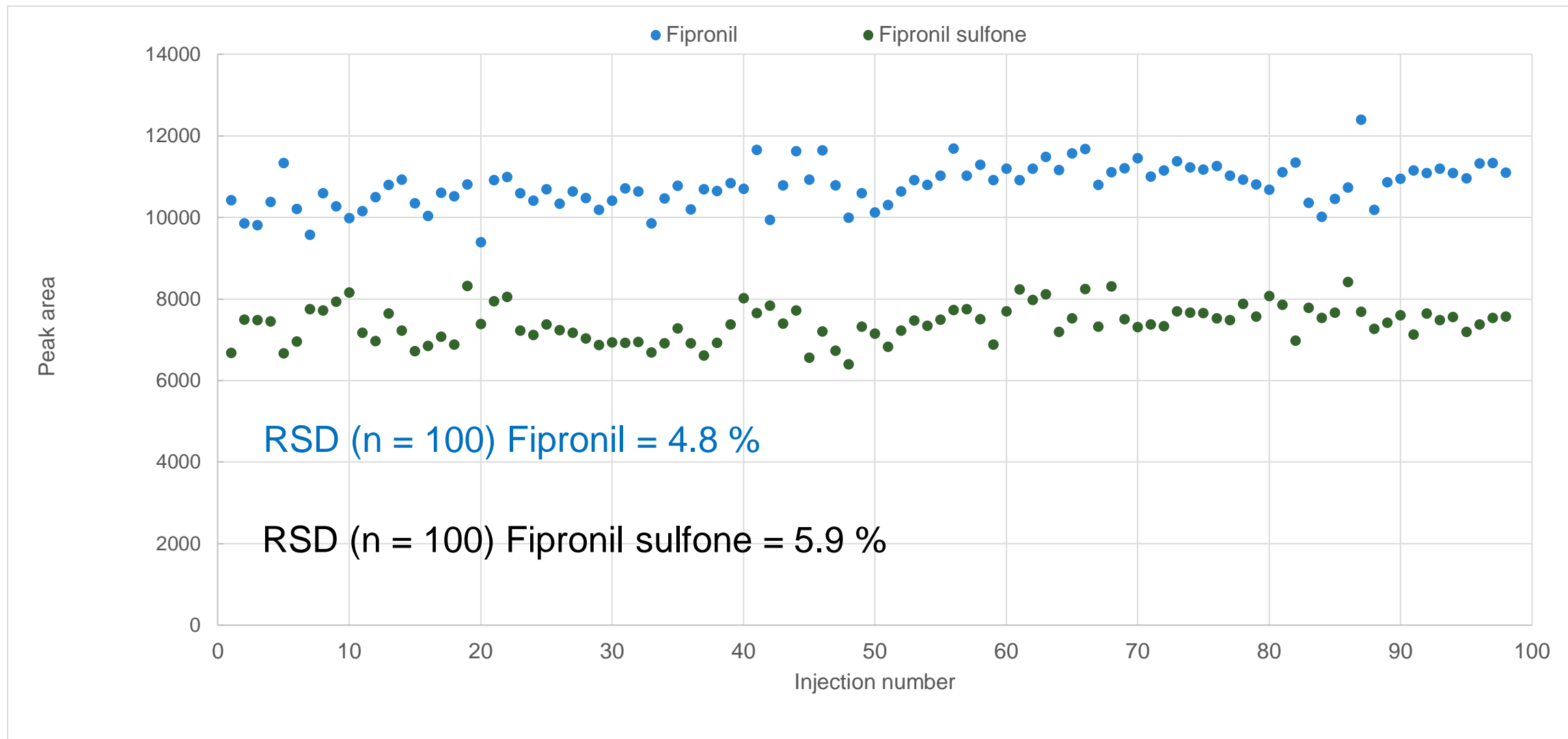


Fipronil sulfone: 5 µg/kg

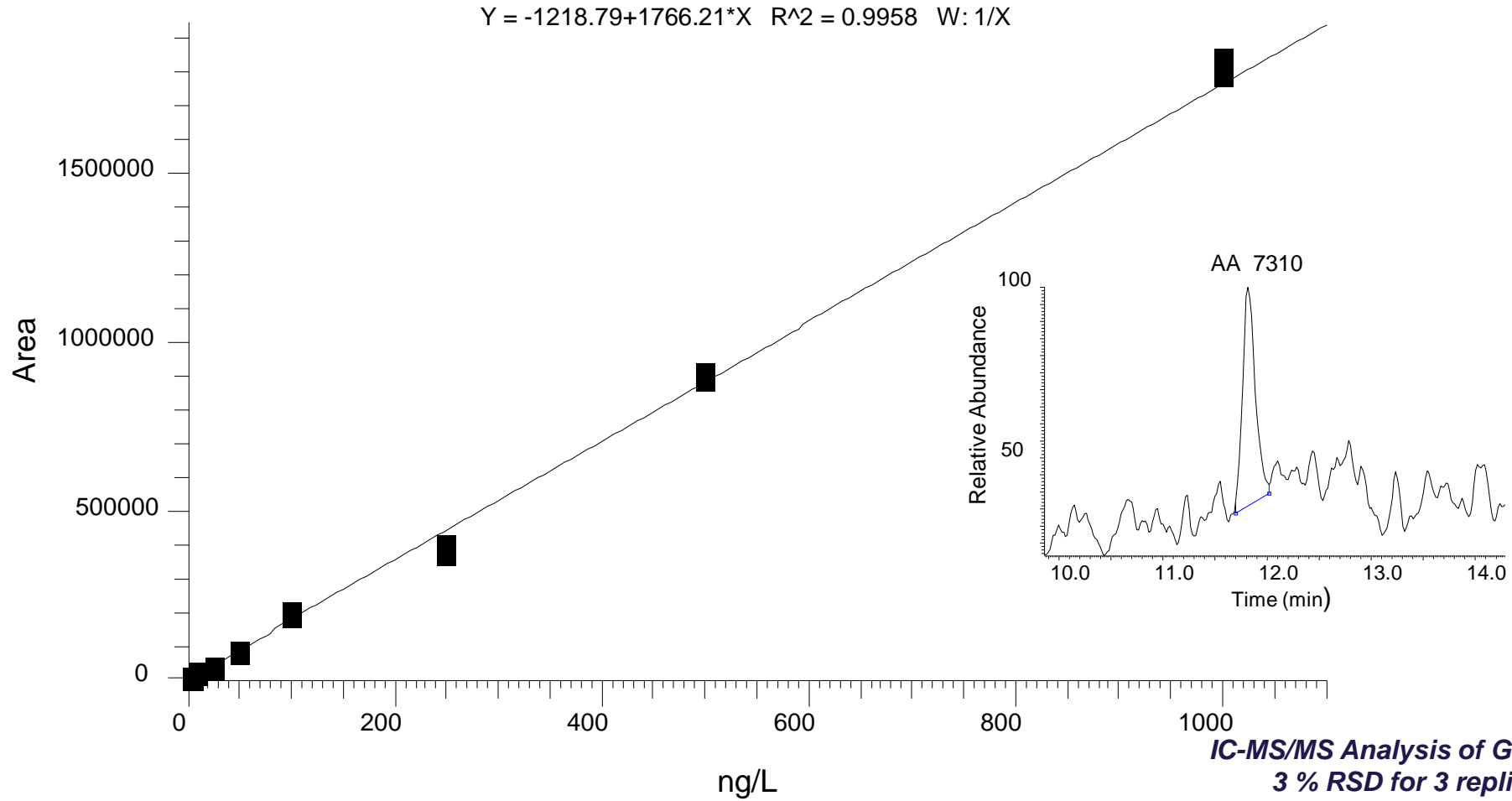


MS: TSQ-Quantis
-ve Ion mode
1 uL inj
QuEChERS extract

Fipronil: Stability of Signal at 10 ng/g

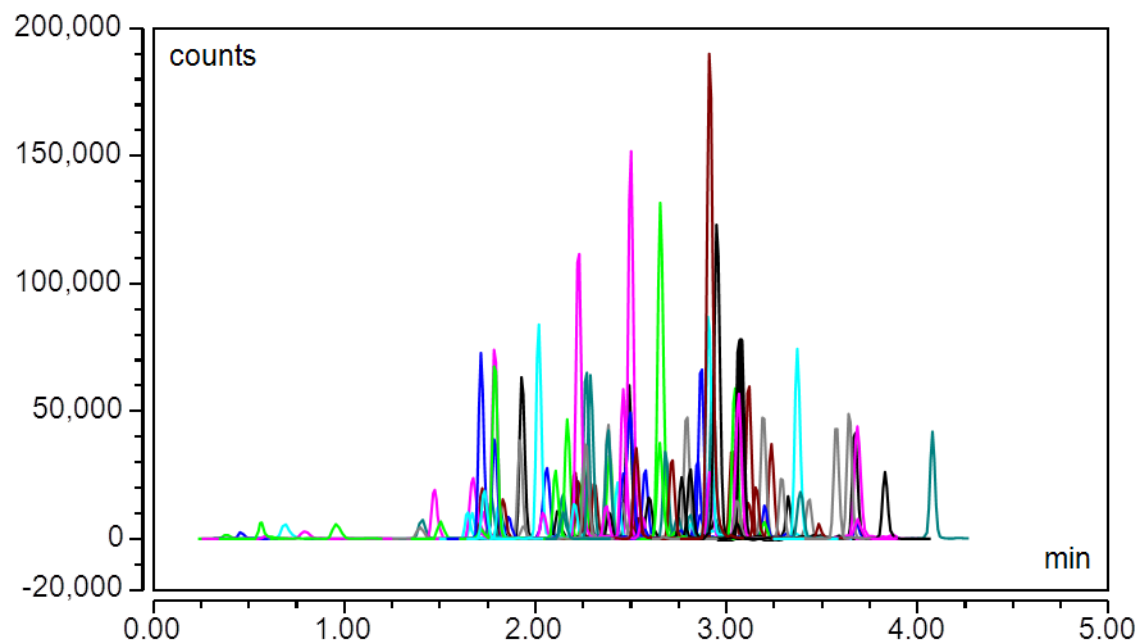


Glyphosate Analysis



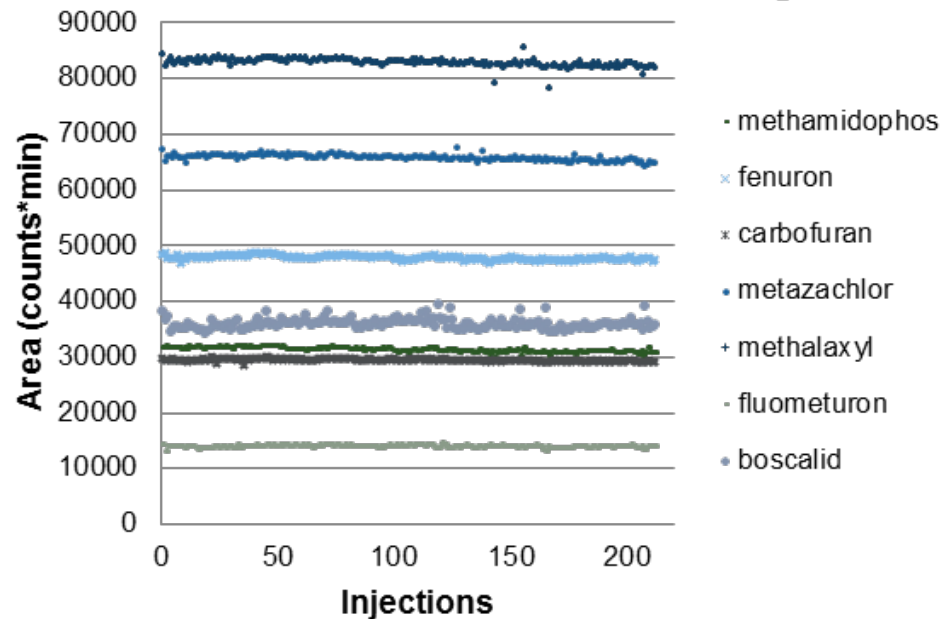
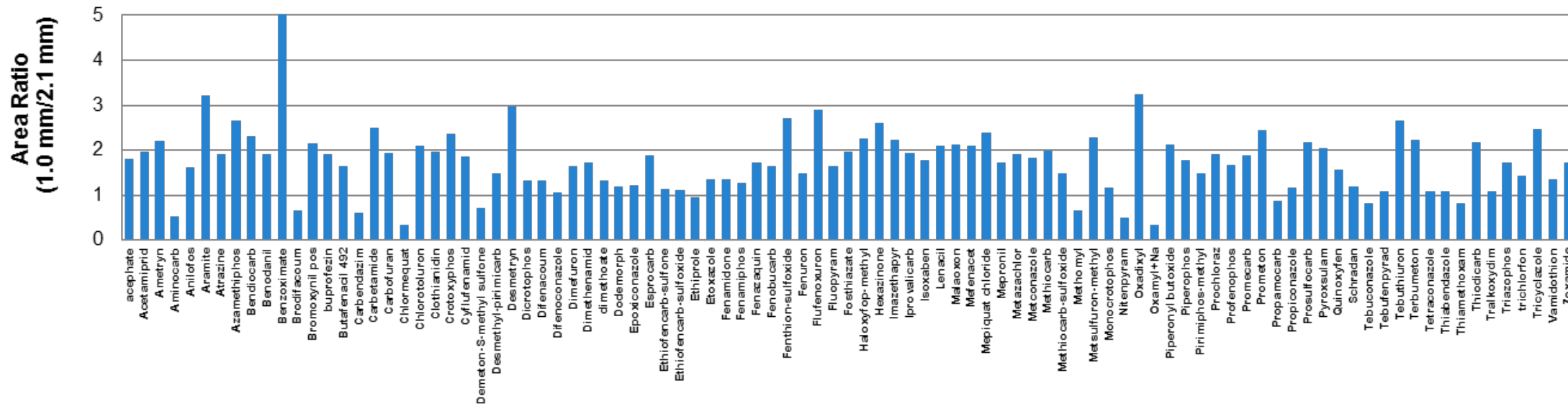
Ongoing Developments in LC-QQQ MS

- Robust LC-MS analysis of pesticides with 1.0 mm ID column using the Thermo Scientific™ Vanquish™ Horizon UHPLC System



- 255 pesticides -Vanquish™ Horizon UHPLC system coupled to QQQ
Maximum system pressure was 1030 bar.
- Pos/neg polarity switching
- Flow rate = 100 μ L/min

Vanquish™ Horizon UHPLC System Performance At Lower Flow



RSD of area response < 2.5% for 200 injections of leek over 2 days

Application note 1160

thermoscientific

APPLICATION NOTE

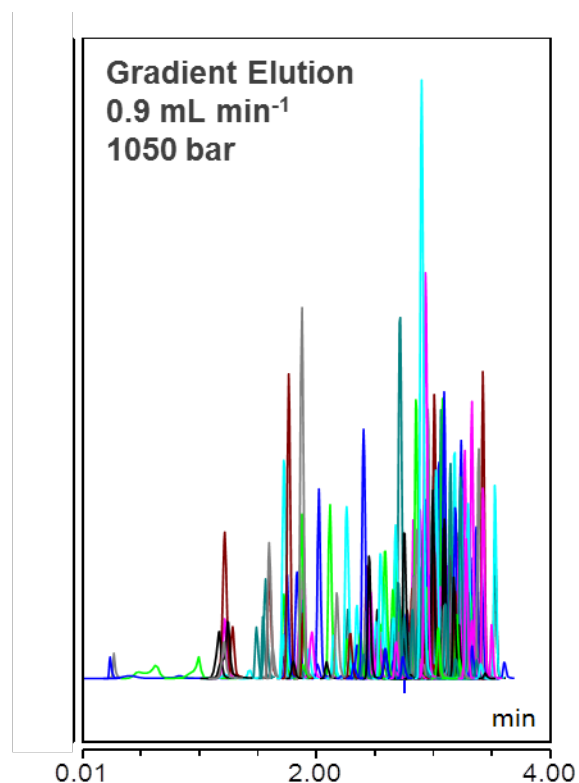
Robust LC-MS analysis of pesticides with 1.0 mm i.d. column using the Vanquish Horizon UHPLC system

No. 1160

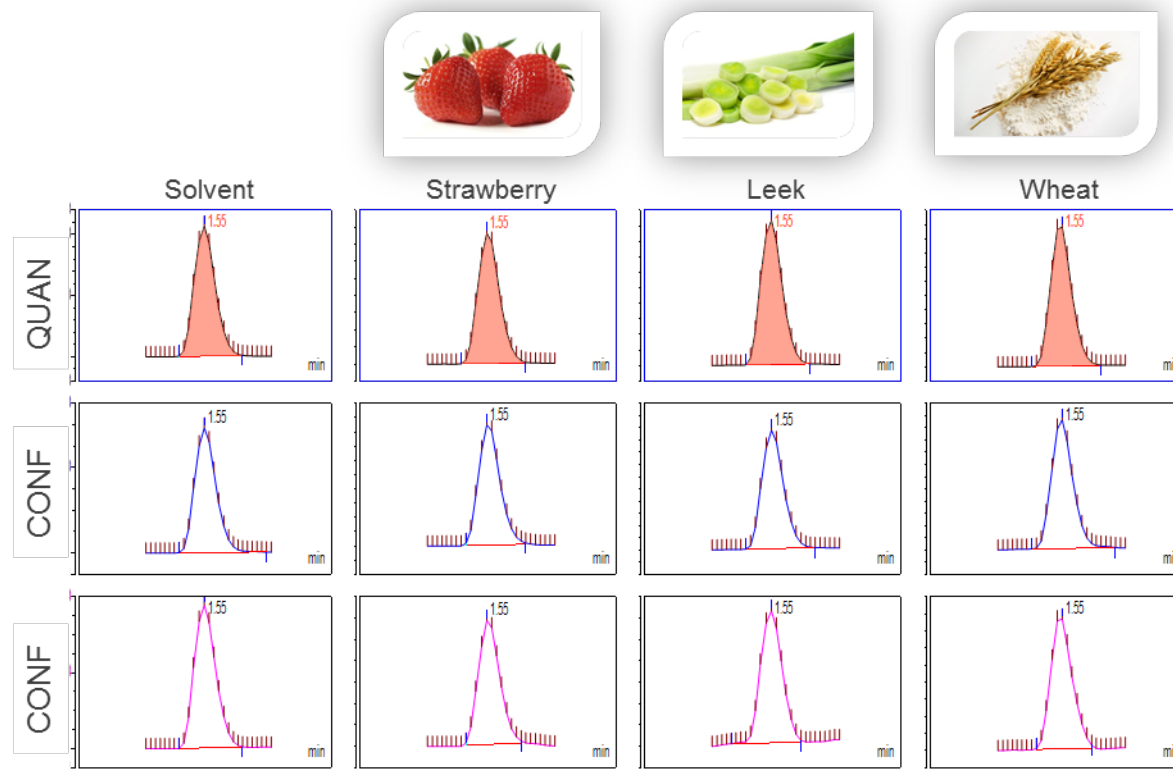
For more information see PV28 Poster

Outstanding RT Reproducibility for Timed-SRM

High throughput pesticide quantitation: > 250 pesticides (1-100 ppb) in less than 4 min



Accucore aQ C18, 100 x 2.1mm, 2.6µm, 2-98 %
Water/MeOH, 5mM Amm formate, 0.1% FA, 25 °C.



Demeton-S-methyl sulfone at 10 µg/Kg

- **Outstanding RT reproducibility** run-to-run and matrix-to-matrix (over 12 hours)
- **Ultra narrow LC peaks** make possible acquisition with **short scan window of 9 sec**
- More than 10-15 data points over the LC peak

This performance is unique for Vanquish™!

Application Note 69741



Authors
 Katerina Bousova,¹ Michal Godula,¹
 Claudia Martins,² Charles Yang,²
 Ed George,² Neloni Wijeratne²

¹Thermo Fisher Scientific,
 Special Solution Center Europe,
 Dreieich, Germany

²Thermo Fisher Scientific,
 San Jose, California

Keywords
 Pesticide Explorer Collection,
 European Regulation 396/2005,
 Commission Directive 2006/125/
 EC, European Commission
 2002/657/EC, SANCO/12571/2013,
 European Commission 788/2012/
 EC, pesticide, food, QuEChERS,
 Vanquish Flex, TSQ Quantis MS,
 TraceFinder software

Goal
 To present a fully tested LC-MS/MS methodology for rapid and robust quantitation of more than 250 pesticides below maximum residue limits (MRLs) with sensitivity, accuracy, and precision that meets stringent EU guidelines.

Introduction
 Pesticides are chemicals used on crops to protect them from the negative activity of pests. As inappropriate application of a pesticide can result in serious health issues, determination of pesticide residues in foods and food products is an important part of routine food control. The European Union (EU) legislation (European Regulation 396/2005 and Commission Directive 2006/125/EC), currently the strictest regulations, sets maximum residue limits of pesticides in various products of plant and animal origin. These regulations present significant analytical challenges due to the low limits of quantitation (LOQ) required in certain food matrices.



The Unofficial Guide to EPRW 2018

Seven pesticide residue experts exemplify a community tackling tough challenges with advanced analytical technology



The EPRW Photo Wall



Download:

<http://tas.txp.to/0518/EPRW2018>

The Wonder Years

