

## WATERS ULTRAPERFORMANCE FOOD SAFETY SYSTEM

Food safety lab increases speed of LC/MS analyses by five times; overall output tripled

Client: Agri-Food and Biosciences Institute

### BACKGROUND

Farm-raised poultry and livestock regularly receive drugs, both licensed and illegal, to protect them from disease and spur their growth. Through ignorance, carelessness or deceit on the part of growers, poultry and livestock prepared for export often contain banned substances or legal drugs at concentrations that exceed maximum allowable European Union levels.

The Chemical Surveillance Department (Veterinary Sciences Division) of the Agri-Food and Biosciences Institute (AFBI), a UK-based organization, tests food of animal origin for residues of both banned substances and licensed veterinary drugs. The department is staffed by approximately 60 scientists analyzing around 35,000 samples annually.

EU legislation dictates the identification criteria for confirming the presence of a veterinary drug residue, including the number of transition ions that must be monitored along with tolerances for acceptable ion ratios. The lab presently uses a mix of traditional HPLC instruments configured with a variety of Waters® mass spectrometers.

### CHALLENGE

As a confirmatory laboratory, speed, sensitivity and accuracy are critically important to the client. The average run time for an HPLC/MS confirmatory method is about 25 minutes. Despite the relatively small number of samples it tests in each batch, the lab must analyze up to 20 standards and quality assurance (QA) samples to confirm the presence or absence of a certain drug. In total, it can take between seven and nine hours to obtain one analytical result. Performing all the requisite QA tests consumes valuable instrument time and makes scheduling difficult and inefficient.

The lab also performs surveillance testing. When the lab suspects that a farmer is using veterinary drugs improperly, it has the authority to detain a shipment of marketable product until the tests have been completed. For these samples, results must be delivered within five days. If a test takes more than five days, and the results come back negative – and the carcass spoils – the grower can sue the laboratory for economic damages. If the lab knows it won't meet the deadline, the only alternative would be but to release the shipment and allow potential health risks into the food supply.

At times the backlog on an instrument can exceed 10 days, from which, the lab manager admits, it can be very difficult to recover. "Nothing is as infuriating as to be sitting on a bunch of samples coming up to their deadline, and knowing that you're not going to be able to get them analyzed in time."



With the ACQUITY UPLC System's five-fold improvement in run time, the lab manager can now schedule two or three batches of samples in an eight-hour period — tripling the lab's output.

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### THE SOLUTION

In 2005, the lab acquired a Waters ACQUITY UltraPerformance LC® (UPLC®) System that was installed on the front end of a Waters Quattro Premier™ XE tandem quadrupole mass spectrometer. The lab manager said it took him about three hours to transfer the 24-minute nitrofurans HPLC separation to a 4.5-minute UPLC separation – one that he says gives him “much better resolution.” The speed of the ACQUITY UPLC System, combined with the Quattro Premier XE’s exceptionally fast scanning and rapid switching between ionization modes, allows the lab to complete runs in less time – and to expand the scope of its multi-residue testing by being able to detect a much larger number of drugs per analytical run.

### BUSINESS BENEFIT

The laboratory took a 25-minute LC/MS run down to four to five minutes, a five-fold improvement in overall run time. The lab manager can now schedule two or three batches of samples in an eight-hour period – tripling the lab’s output.

Probably the largest benefit is in methods development. In developing any HPLC method, a typical reversed-phase HPLC gradient method tends to take anywhere from 25 to 30 minutes. “If UPLC runs are four to five minutes, essentially you don’t have time for a cup of tea before you know whether your run worked or not and you are ready to do your next injection. At least with UPLC, you know very quickly. What we’ve found is that methods development is much more rapid with UPLC than with traditional HPLC,” the lab manager says.

UPLC also scores very high when it comes to retention time repeatability. In an overlay of 16 injections over an eight-hour period, this lab manager has seen “absolutely no drift in retention time to speak of.”

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