Introduction
Avermectins are antibiotics used against nematode and arthropod parasites in food producing animals.\textsuperscript{1-4} While these substances are legal for use in beef cattle and salmon, only specific types of avermectins are permitted for use in lactating dairy cows.\textsuperscript{1,3} The US, EU, People’s Republic of China, and Canada monitor and regulate the level of avermectins that may be found in edible tissues of food producing animals and milk.\textsuperscript{1,2}

Depending on the country and particular compound, the permitted levels range from a 20-40 ppb level or 20-600 ng/g level in tissue or milk samples.\textsuperscript{1,2,5} For this reason, it is necessary to develop sensitive and accurate methods that can detect, identify and quantitate avermectins at low levels. This LC/MS method may be used for the detection and quantitation of abamectin, one of the avermectins used to fight parasitic infections in cattle, sheep and pigs.\textsuperscript{1,2}

HPLC Conditions
Column: Polaris\textsuperscript{\textregistered} C18-A, 5 μm, 50 x 2 mm ID (Varian Part No. A2000050X020)
Solvent A: Water
Solvent B: Methanol
LC Program:

<table>
<thead>
<tr>
<th>Time (min:sec)</th>
<th>%A</th>
<th>%B</th>
<th>Flow (µL/min)</th>
</tr>
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<tbody>
<tr>
<td>00:00</td>
<td>15</td>
<td>85</td>
<td>300</td>
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<tr>
<td>03:00</td>
<td>15</td>
<td>85</td>
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</tbody>
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Injection Volume: 10 µL

MS Parameters
Ionization Mode: ESI Positive
API Drying Gas: 25 psi at 300 °C
API Nebulizing Gas: 55 psi
Needle: 5000 V
Shield: 600 V
Detector: 1700 V

Table 1. MS Transitions.
\begin{tabular}{|c|c|c|}
\hline
Analyte & Transition & Collision Voltage \\
\hline
Abamectin & 895.6 > 327.4 & 26 V \\
         & 895.6 > 449.3 & 15.5 V \\
         & 895.6 > 751.0 & 9 V \\
\hline
\end{tabular}

Results & Discussion
Using the above-mentioned chromatography and mass spectrometry parameters, abamectin was analyzed from 1 ppb to 1 ppm. The overlaid chromatogram of different concentration injections is shown in Figure 2. Even at 0.001 ppm, abamectin is detected at a signal-to-noise (S/N) ratio of 619:1. Figure 3 shows a close-up of the 1 ppb injection of abamectin displayed in Figure 2.

This experiment established a standard curve for the determination of abamectin, and measured a sample of unknown concentration. Quantitative analysis was performed using the MS/MS transition m/z 895.6 > m/z 751.

The calibration curve for abamectin from 1 ppb to 1 ppm had an $r^2$ value equal to 0.99907 and %RSD of 3.5% (See Figure 4). Using this calibration curve, it was determined that the concentration of the unknown sample of abamectin was 0.75 ppm.
Conclusion

This LC/MS/MS method is fast, sensitive and accurate for the detection and quantitation of abamectin. The calibration curve was found to be linear and precise from 1 ppb to 1 ppm, yielding a low RSD of 3.5%. The Varian 1200L triple quadrupole mass spectrometer is a reliable, sensitive and accurate instrument for the analysis of abamectin.

References


These data represent typical results.
For further information, contact your local Varian Sales Office.