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Quantitative determination of NSAIDs residues in porcine muscle: Comparison of LC-MS/MS and LC-HRMS measurement

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To ensure food safety, European regulations require the monitoring of chemical contamination of foodstuffs of animal origin. This monitoring is based on a range of analytical methods capable of detecting, in particular, residues of veterinary treatment products, in order to implement national control plans. In this context, a method for monitoring Non-steroidal anti-inflammatory drugs (NSAIDs) in porcine muscle by LC-Mass spectrometry was developed for the determination of 22 target substances, including metabolites, at concentration in line with regulatory limits.

Non-steroidal anti-inflammatory drugs (NSAIDs) are a class of chemically heterogeneous compounds, comprising organic acids and basic compounds. Some are authorized in food-producing animals (group B1(d) of Commission Delegated Regulation (EU) 2022/1644 and some are unauthorized (Group B3(f)). So considering their different regulatory status, range of concentration for validation was considered either between 0.1 MRL to 2 MRL, either to 0.5 MMPR to 2 MMPR, resulting in levels ranging from 0.5 µg/kg (diclofenac) for the lowest to 1000 µg/kg (carprofene) for the highest.

While detection by triple quadrupole mass spectrometry is the most commonly used technology for quantitative trace measurements, high-resolution mass spectrometry, which is increasingly used in laboratories, also has real quantitative measurement capabilities. The proposed analytical method for confirmation of acidic and basic NSAIDs has been validated in accordance with the new (EU) 808/2021 Regulation, using both LC-MS/MS and LC-HRMS detection on a TSQ Vantage Triple quadrupole mass spectrometrer and a Q-Exactive mass spectrometer respectively. The appropriate acquisition mode was applied for each instrument, namely MRM mode for TSQ and FS-PRM mode for Q-exactive. The extracts prepared for the validation phase were split in two portions to enable the same extracts to be analysed on both instruments, and to enable the results to be compared. Characterization of performances criteria such as trueness, precision, decision limit CCα, detection capability CCβ were assessed. The quantitative performances of both technologies were very similar. Results for porcine muscle will be presented and discussed.

Keywords : residues, non steroidal anti-inflammatory drugs NSAIDs, LC-MS/MS analysis, LC-HRMS analysis, validation

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